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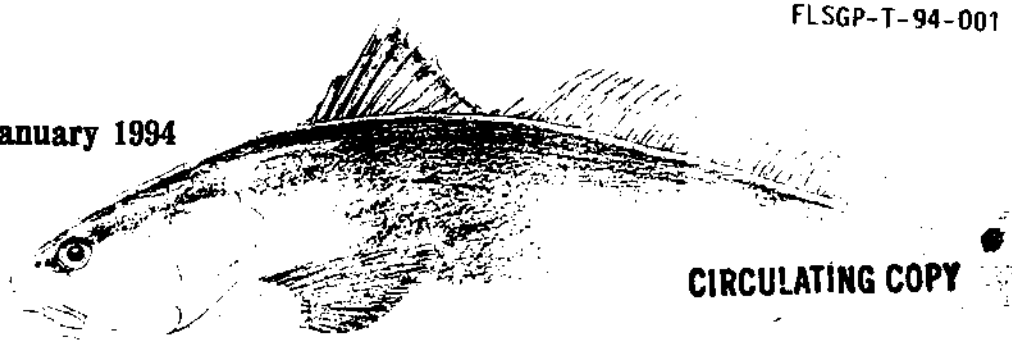
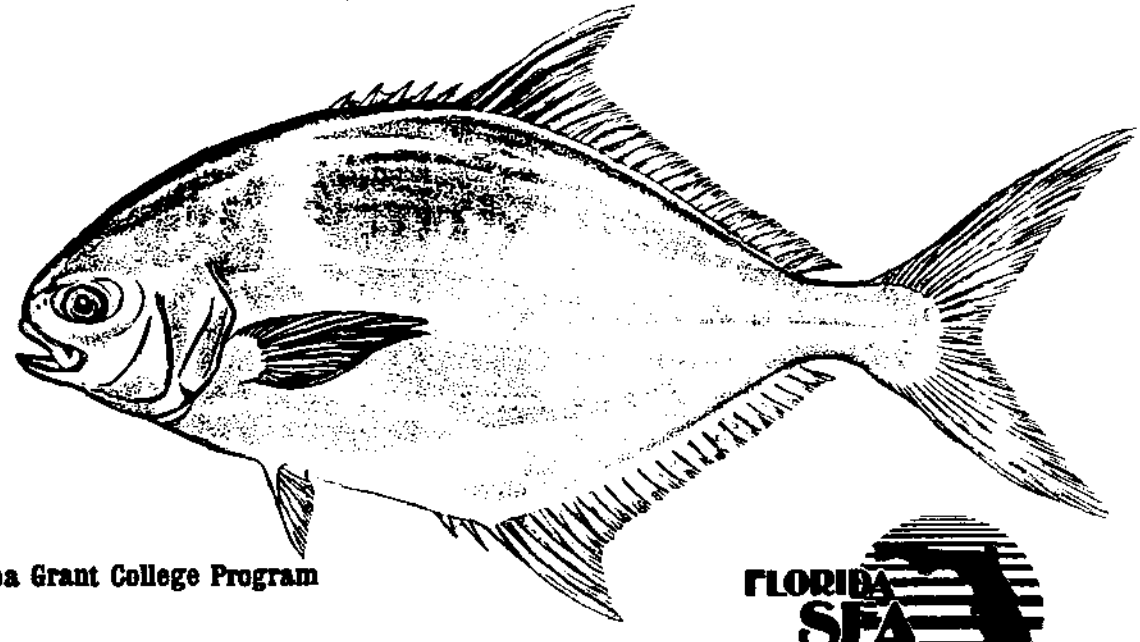


Recreational Anglers' Valuation of Near-Shore Marine Fisheries in Florida

J. Walter Milon, Eric M. Thunberg, Charles M. Adams and C.T. Jordan Lin



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Recreational Anglers' Valuation of Near-Shore Marine Fisheries in Florida

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January 1994

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EXECUTIVE SUMMARY

This report describes and summarizes the results from a state-wide survey of Florida resident saltwater anglers. The survey was designed to provide estimates of the economic value anglers place on marginal changes in management of selected near-shore marine species.

The Contingent valuation method was used to elicit angler willingness to pay for changes in management for redfish, seatrout, mullet, sheepshead, pompano, and king mackerel. Contingent valuation is a process in which respondents are presented with a detailed scenario that describes an opportunity to express their willingness to pay for a proposed change in current conditions. The process consists of three parts. First, the change in current conditions, or the "good" to be valued is described. Second, the payment method is described. The payment method is usually closely related to typical methods of buying goods similar to the one to be valued. Finally, the respondent is asked how much they would pay for the good described in the scenario. A special saltwater fishing license stamp that would allow the holder to take advantage of the described management change was used as a payment mechanism.

The contingent valuation questions used in this study were administered via a mail survey that was part of a larger survey based on the telephone portion of the Marine Recreational Fishing Statistics Survey (MRFSS) conducted by the U.S. National Marine Fisheries Service (NMFS). Based on initial telephone contacts, detailed interviews were conducted with anglers who had fished in the prior 2 months. In 1991-1992, the period for the survey work reported here, over 76,500 household interviews were conducted and over 10,700 anglers were interviewed. A representative sample of 4,206 anglers was selected for participation in this research project.

Three types of marginal changes in current management for selected near-shore species were considered: 1) changes in bag limits, 2) changes in size limits, and 3) changes in average catch rates. In some scenarios these changes were presented only for 1 or 2 species whereas, in other scenarios, 2 or 3 changes were grouped together as part of a package. While there are an infinite number of possible ways that management for these species could change, 26 different scenarios were developed for this study based on current fishery management concerns.

Data from the contingent valuation survey were used to test for differences in average willingness to pay for each management change on the basis of a) the magnitude of the change, b) whether the respondent owned a boat, and c) differences in species group targeting preferences. Also a test whether average willingness to pay differed between management changes presented as a package and the sum of average willingness to pay for individual management changes was conducted.

A summary table showing state-wide average values for management changes and average values per fish is presented below. The first column of the table lists the study species and their associated management changes. The second column shows the average values for the state elicited through the contingent valuation survey. For example, the average value for a

management change that would increase redfish bag limits from one to two fish was $1.94. The third column reports the average value per fish. This latter value was computed by dividing the average value for the management change by the expected marginal change in the number of fish and number of occasions upon which the individual takes advantage of the change. For example, the expected marginal change for an increase in the seatrout bag limit from ten to

Species and Valuation Scenario	Average Value for Management Change	Average Value per Fish
REDFISH		
Bag Limit		
1 to 2	$1.94	$1.94
1 to 3	$2.87	$1.44
Average Catch		
2 to 3	$2.15	$2.15
2 to 4	$2.42	$1.21
Size Limit		
0 to 1 > 27"	$1.50	—
0 to 2 > 27"	$2.60	—
SEATROUT		
Bag Limit		
10 to 15	$1.36	$0.27
10 to 20	$1.16	$0.12
Average Catch		
3 to 5	$1.74	$0.87
3 to 7	$1.67	$0.42
Size Limit		
0 to 1 > 24"	$1.35	—
1 to 2 > 24"	$1.36	—
MULLET		
Bag Limit		
50 to 75	$0.66	$0.03
50 to 100	$0.67	$0.01
SHEEPSHEAD		
Bag Limit		
None to 10	$1.01	$0.20
None to 5	$1.01	$0.10
POMPANO		
Bag Limit		
None to 4	$1.44	$0.11
None to 2	$0.65	$0.29
KING MACKEREL		
Bag Limit		
2 to 5	$2.05	$0.68
2 to 10	$2.33	$0.29
Average Catch		
1 to 2 every 3rd trip	$1.99	$5.97
1 every 3rd trip to 1 every trip	$1.85	$2.78

fifteen fish, is five. Assuming the individual takes advantage of the five fish change on one occasion in a year, then the average value per fish is $0.27 ($1.36/5 fish times 1 trip). In the summary table, per fish values are calculated assuming the individual takes advantage of the management change on only one trip per year.

Across all management changes and species, average values were not very sensitive to the magnitude of the change. For example, statistical tests found no difference in average values for seatrout bag limit changes of from ten fish to fifteen fish and from ten fish to twenty fish. The same conclusion was reached for bag limit, average catch, and size limit scenarios for all other species.

Comparing the average values across species reflects some perceived differences in species desirability. For example, individuals appeared to place a relatively low value on management changes for mullet and sheepshead as compared to that expressed for redfish and king mackerel. Also, a comparison between average values for bag limit and average catch changes indicates a general preference for management changes that increase the number of fish caught without changing current bag limits.

Statistical tests were conducted to determine whether boat ownership or species targeting preferences influenced average values for management changes. The results of these tests showed no difference in average values for management changes for boat owners and individuals who did not own a boat. In the majority of cases no difference was found in average values for individuals with differing species group targeting preferences. However, for king mackerel, a consistent pattern emerged in which individuals preferring offshore game species had higher values for king mackerel management changes as compared to individuals preferring to target other species groups.

In all cases, a large percentage of survey respondents indicated a $0.00 value for the proposed management change. The percentage of zero dollar values ranged from a low of 60 percent for redfish average catch changes to a high of 95 percent for mullet bag limit changes. For those species in which average catch scenarios were presented, the number of zero values was lower for average catch scenarios as compared to bag limit or size limit changes. In response to follow-up questions regarding reasons for giving a zero value, the three most frequent reasons were that a) the individual did not fish for the particular species, b) the individual did not want to keep any more fish than he/she already did, and c) the individual did not want to pay any more to fish than he/she already did.

Across the majority of species and management changes considered in this study, the statistical results indicated that recreational anglers did place an economic value on marginal changes in catch regulations. However, the values for specific changes were not well-defined and varied considerably across respondents. The pattern of variation did not depend upon factors that would be expected to influence willingness to pay such as target species preferences and boat ownership. Further, there was a high percentage of respondents who gave zero willingness to pay. This finding does not mean that respondents did not place any economic

value on catching fish. Rather, it means that these anglers placed no value on the particular management changes that were presented. They were generally satisfied with the existing catch regulations and were not willing to pay more to catch or keep more fish. However, standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero willingness to pay, there were some respondents who placed a high value on the proposed changes.

RECREATIONAL ANGLERS' VALUATION OF NEAR-SHORE MARINE FISHERIES IN FLORIDA

1. INTRODUCTION

1.1 Purpose of the Study

Population growth and higher demand for seafood products have contributed to increased recreational and commercial harvesting pressures on fishery stocks in Florida waters. The increased demands for limited fishery stocks has led to contentious debate over management methods and the allocation of stocks to different user groups. A key element in this debate has been the lack of economic information about the value of near-shore species, such as redfish and seatrout, to different user groups, especially recreational users. The last study which attempted to estimate recreational values for fishery stocks was conducted in 1980-81 (Bell, Sorenson, and Leeworthy 1982) but even that study did not focus on the economic value of specific species. Thus, this study was designed to fill this information gap by using survey methods to estimate Florida resident recreational anglers' values for near-shore species. These species are: redfish, seatrout, mullet, sheepshead, pompano, and king mackerel.

In order to understand the survey procedures and results for this study, it is important to clarify the meaning of the term economic value as it applies to fish species and recreational users. Economic value can mean the "total" value of a fishery stock or the "marginal" value of changes in the fishery stock. It is sometimes argued, usually by sport fishing advocates, that recreational fishing expenditures such as boat and fishing gear expenses can be used to measure the total value of a specific stock. This argument is incorrect because expenditures for these goods may remain exactly the same whether or not a specific stock is available to recreational users. Fishing expenditures only measure the cost of going fishing, they are not a measure of economic value. The proper measure of a stock's economic value is recreational anglers' willingness to pay for the stock of a species rather than do without it. The sum of all recreational anglers' willingness to pay measures the total value for the fishery stock.

While it may be interesting to know the total economic value of a fishery stock to recreational users, this is rarely useful for most fishery management decisions. Fishery regulations make marginal changes in the availability of a fishery stock through such devices as changes in bag limits, minimum and maximum sizes, and season duration. Changes in regulations effect the quality of recreational fishing trips, not overall access to the fishery stock. Recreational anglers' willingness to pay for these marginal changes is the proper measure of the economic value of these regulations. For example, the sum of all anglers' willingness to pay for a change in the bag limit for redfish from 1 to 2 fish per trip would measure the economic value of this marginal change in fishery regulations. Alternatively, a change in regulations that would decrease the bag limit could be valued by measuring anglers' willingness to pay to avoid

the decrease. These marginal values for incremental changes in stock availability are the most appropriate measures of economic value for fishery management decisions.

It is important to recognize that marginal changes in fishery stock availability can involve 1 or more units of fish. For example, an increase in the bag limit from 1 to 2 redfish and an increase in the bag limit for seatrout from 10 to 15 fish are both marginal changes. The increment of change is the important unit of measurement and would be the focus for economic valuation. Other units of value, such as the value per fish, can then be derived from the marginal value.

Some readers may have difficulty with the use of willingness to pay, or a "user pays" principle, in the case of recreational fisheries. Recreational fishing in Florida has traditionally been viewed as a free good for anyone to enjoy. This view is yielding to an awareness that Florida's fishery resources are limited and it is desirable to allocate those resources to their highest and best use. The Florida Marine Fisheries Commission and the State Cabinet are responsible for acting as the public's trustee and for determining the highest and best use of the limited fishery resources. It is easier to determine the value of other resources such as beachfront property or forest land because there are active markets for these goods. But, there are no direct markets for fishery resources. In lieu of this type of market information, recreational anglers' willingness to pay for marginal changes in fishery stocks is one indicator of the economic value of recreational uses of these stocks.

Marginal economic values can be used in a benefit-cost analysis of fishery management alternatives. For example, the benefits of increasing the average daily recreational catch of redfish, or any other species, can be compared to the costs of a hatchery operation that would augment the wild stock. Alternatively, marginal values for changes in recreational catch of a species can be compared to marginal values for other user groups to determine the relative value of alternative allocations of stocks to different user groups. A complete discussion on the use of marginal economic values in fishery management decisions is beyond the scope of this report. For further detail, the interested reader should consult Edwards (1991) and Milon (in press).

1.2 Marginal Economic Value and Contingent Valuation

Marginal economic values for changes in fishery regulations are not typically available because anglers rarely pay for incremental units of catch. Most state fishing licenses, like the Florida saltwater fishing license, grant access to a public resource subject to current regulations. However, in some cases, special licenses may provide additional privileges such as the Florida tarpon "tag" to allow anglers to possess a tarpon for trophy mounting or other purposes.

Since there is no direct way to measure anglers' marginal economic value of fish species, it is necessary to use survey methods. The most popular survey method for eliciting marginal economic values is called contingent valuation (CV). In a CV survey a respondent is asked for his or her willingness to pay for a hypothetical change in a situation. For example, an angler could be asked how much he would be willing to pay for an increase in the bag limit for redfish

from 1 to 2 fish. Aggregating these responses across a representative sample of all anglers then provides an estimate of the average marginal value for a 1 fish increase in the bag limit.

The CV method has been applied in numerous studies over the past decade in order to measure the value of recreational goods such as sport fish. The U.S. Army Corps of Engineers and other federal agencies have employed CV studies and recent federal court decisions have upheld the validity of CV as a means of measuring recreational values (Mitchell and Carson; Kopp, Portnoy, and Smith). While CV has many pitfalls and the method must be used with care (see Chapters 5 to 9 in Mitchell and Carson), it is still the single best approach for measuring the value of potential changes that effect the quality of recreational activities.

1.3 Overview of the Report

The CV analysis of the recreational value of near-shore species was conducted through a mail survey of resident anglers throughout Florida. Section 2 presents a description of the survey methodology, sample size, and statistical profiles of the survey respondents. This section also describes the design of the CV questions and the types of regulatory changes that were considered for each species. Sections 3 to 8 provide results from the CV analysis for each species in the following sequence: redfish, seatrout, mullet, sheepshead, pompano, and king mackerel. Section 9 provides results from part of the CV analysis that considered simultaneous changes in several species regulations, described as "regulation packages," and compares these results to the valuation estimates for changes in individual species regulations. Section 10 discusses how the results from Sections 3 to 9 can be used in fishery management decisions. The final section provides an overall evaluation and assessment of the CV survey and results. Recommendations for future research are also presented.

2. CONTINGENT VALUATION SURVEY METHODOLOGY

2.1 Survey Design and Procedures

The contingent valuation (CV) questions used in this study were administered via a mail survey that was part of a larger survey based on the telephone survey portion of the Marine Recreational Fishing Statistics Survey (MRFSS) conducted by the U.S. National Marine Fisheries Service (NMFS). The MRFSS is designed to provide a representative sample of households throughout Florida. Based on initial telephone contacts, detailed interviews were conducted with anglers who had fished in the prior 2 months. In 1991-1992, the period for the survey work reported here, over 76,500 household interview were conducted and over 10,700 anglers were interviewed. Of these anglers, a representative sample of 4,206 anglers was selected for further questions as part of this research project. These respondents were asked questions that were part of the University of Florida (UF) Participation Survey (see Appendix 1) and were asked if they would be willing to participate in a follow-up mail survey called the UF Angler Survey (Appendix 2). A complete description of these survey procedures are provided in a companion report titled, A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing, J. Walter Milon et al., Florida Sea Grant Report (SGR-112).

Figure 2-1 shows the basic structure of the survey design. Of the 4,206 anglers who responded in the UF Participation Survey, 2,349 anglers returned the UF Angler Survey. This represents a response rate of 53.8 percent once undeliverable surveys were excluded. The CV questions used in this study were included in the UF Angler Survey and are described in more detail below.

2.2 Socioeconomic Profile of Respondents

Socioeconomic characteristics of respondents to the UF Angler Survey are reported in Table 2-1. The table shows that Florida resident anglers were typically white, middle-aged males who had lived in Florida for more than 10 years. A high percentage preferred outdoor recreation activities and a large majority had been fishing since childhood. Many anglers owned their own boat.

Since the UF Angler Survey was conducted by mail and was drawn from the sample of respondents to the UF Participation Survey, the possibility of nonresponse bias in the mail survey results was considered. A comparison of socioeconomic characteristics for respondents to both surveys showed no difference between the two groups. Thus, the Angler Survey results, which included the CV questions, were derived from a representative sample of Florida resident anglers. The complete socioeconomic profiles for the two groups are provided in the companion report cited in Section 2.1.

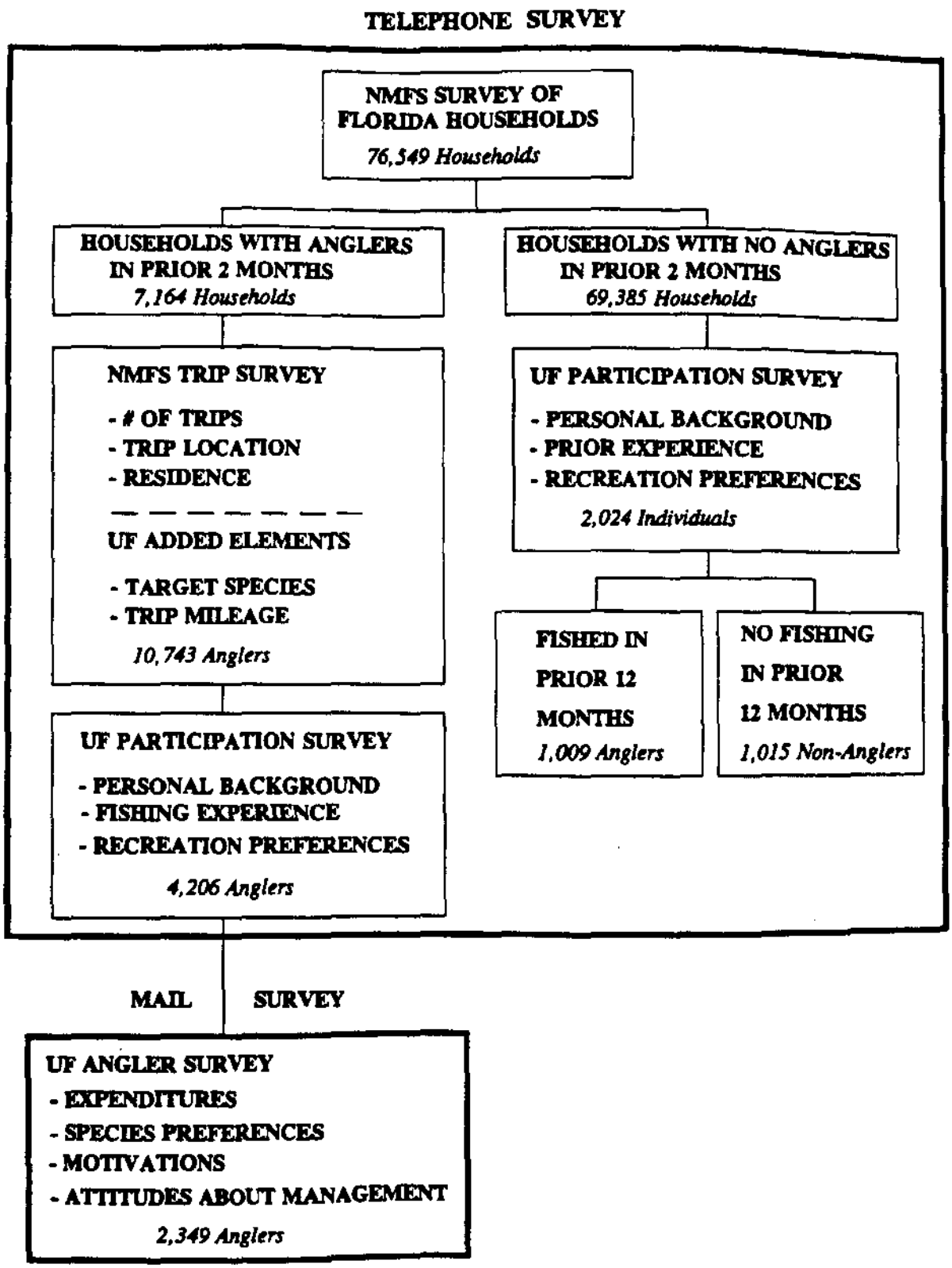

Figure 2-1. Overview of Survey Methodology and Sample Sizes.

Table 2-1. Summary Statistics for Socioeconomic Characteristics of Contingent Valuation Survey Respondents

Variable	UF Mail Survey[a]
Age	43.4
	(7.61)
Gender (% Male)	82.1%
Years in Florida	
Less than 5	13.4%
5-10	15.2%
11-20	24.2%
More than 20	47.2%
Ethnic Group	
White	94.9%
Black	2.9%
Other	2.2%
Percent Hispanic	4.4%
Marital Status	
Single	18.8%
Married	69.9%
Other	11.3%
Number in Household	2.88
	(0.62)
Percent With Children Under 18	39.8%
Education	
High School	9.2%
High School Graduate	29.2%
College	30.3%
College Graduate	20.2%
Post-Graduate	10.6%
Income	
Under $25,000	20.3%
$25,000-$49,000	39.7%
$50,000-$74,999	15.7%
Over $75,000	9.8%
No Response	14.5%
Fishing Experience as a Child	
None	16.1%
Little	5.1%
Moderate	25.6%
Extensive	53.2%
Leisure Preferences	
Indoor	2.0%
Moderate Outdoor	31.7%
Extensive Outdoor	65.7%

[a]Sample means reported with standard deviation in parentheses.
[b]Totals may not sum to 100% due to incomplete responses to all items and rounding.

2.3 Contingent Valuation Methodology and Management Scenarios

Contingent Valuation (CV) is a process in which respondents are presented with a detailed scenario that describes an opportunity to express their willingness to pay for a proposed change in current conditions. The process consists of three parts. First, the change in current conditions, or the "good" to be valued is described. Second, the payment method is described. The payment method is usually closely related to typical methods of buying goods similar to the one to be valued. Finally, the respondent is asked how much they would pay for the good described in the scenario. This procedure may require a written answer, a circle around an appropriate value from a table of possible values, or other possible ways of expressing a respondent's response. In each step of the process, it is very important that the respondent has clear choices that are perceived as realistic given current conditions.

The CV process used in this study was administered as part of the UF Angler Survey. The near-shore species considered were: redfish, seatrout, mullet, sheepshead, pompano, and king mackerel. Three different types of changes in current conditions for these species were considered: 1) changes in bag limits, 2) changes in size limits, and 3) changes in the catch rate. In some scenarios these changes were presented only for 1 or 2 species whereas in other scenarios 2 or 3 changes were grouped together as part of a package. While there are an infinite number of possible ways that current conditions for these species could change, 26 different scenarios were developed for this study based on current fishery management concerns. These 26 scenarios are defined and identified by number in Table 2-2.

The scenarios described in Table 2-2 include 22 scenarios in which a change in current conditions for 1 of the 6 near-shore species is evaluated and 4 scenarios in which a group of these species is considered as a package. It is important to understand that a single respondent was presented with only 3 or 4 of the 26 possible scenarios. This was done to make it easier for a respondent to understand and respond to the CV process. The different scenarios were grouped into 8 forms and randomly distributed across equal portions of the mail survey sample so that it was possible to elicit responses for each scenario from representative subgroups of the total sample. Table 2-3 provides a summary of each form and the specific scenarios included on each form. Copies of each of the 8 forms used in the UF Angler Survey are provided in Appendix 3.

2.3.1 Bag Limit Scenarios

As shown in Table 2-2, there were 12 scenarios in which bag limits for individual species were evaluated. In each of these scenarios, the respondent was informed of the current bag limit for the species and then asked their willingness to pay for a possible change in the bag limit for that species. For the redfish, seatrout, mullet, and king mackerel scenarios, current regulations were defined as the base and respondents were asked to pay for specific increases in the bag limit for each species (Table 2-2). However, in each case, a respondent was asked to pay only if they wanted to exceed the current bag limit. If a respondent was satisfied with the current bag limit, no payment was required. Thus, the CV process in these scenarios elicited the economic

Table 2-2. Management Scenarios Selected for the Contingent Valuation Survey

	Management Alternatives		
Single Species	Bag Limit	Size Limit	Average Catch
Redfish	1) 1 to 2 2) 1 to 3	13) 0 to 1 fish > 27" 14) 0 to 2 fish > 27"	17) 2 to 3 fish per trip 18) 2 to 4 fish per trip
Seatrout	3) 10 to 15 4) 10 to 20	15) 1 to 2 fish > 24" 16) 0 to 1 fish > 24"	19) 3 to 5 fish per trip 20) 3 to 7 fish per trip
Mullet	5) 50 to 75 6) 50 to 100		
Sheepshead	7) None to 5 8) None to 10		
Pompano	9) None to 2 10) None to 4		
King Mackerel	11) 2 to 5 12) 2 to 10		21) 1 to 2 every 3rd trip 22) 1 every 3rd trip to 1 every trip
Species Groupings			
Package 1 (23)			
Redfish, Seatrout, Mullet	1 to 2 10 to 15 50 to 75		
Package 2 (24)			
Redfish, Seatrout, Mullet	1 to 3 10 to 20 50 to 100		
Package 3 (25)			
Sheepshead, Pompano	None to 10 None to 4		
Package 4 (26)			
Sheepshead, Pompano	None to 5 None to 2		

Table 2-3. Summary of Contingent Valuation Scenarios by Survey Form

Survey Form	Contingent Valuation Scenarios
FORM A	1, 13, 5, 10
FORM B	3, 16, 11, 8
FORM C	2, 14, 6, 9
FORM D	4, 15, 12, 7
FORM E	23, 24
FORM F	25, 26
FORM G	17, 19, 21
FORM H	18, 20, 22

value of marginal increases in current bag limits. The payment method used in these questions will be discussed in more detail later in this section. The values reported for these species in later sections should not be interpreted directly as marginal values for an additional fish; further discussion on the interpretation of the marginal values will be provided in Section 10.

Other species that were considered for possible bag limit changes in this study were sheepshead and pompano (scenarios 7 to 10 in Table 2-2). Currently these species are not subject to bag limits. Therefore, the scenarios described a proposed bag limit and offered the respondent an opportunity to obtain a special permit that would allow the permit holder to exceed the proposed bag limit. No payment was necessary if the respondent was satisfied with the new proposed bag limit. For these species the respondent was being asked to pay to avoid a bag limit reduction instead of an increased bag limit as described for redfish. However, for both types of bag limit scenarios, the CV process was designed to elicit marginal economic values for the number of fish an angler may keep from their daily catch.

Table 2-2 also shows the packages of bag limit changes for individual species that were used in scenarios 23 to 26. Redfish, seatrout, and mullet formed one group of species because only proposed increases in bag limits were considered for these species; reductions in current bag limits for sheepshead and pompano were considered as a second group. These package scenarios were developed because an angler may catch one of these species while fishing for another. In addition, eliciting payment for a group of bag limit changes provides a comparison with the values elicited for bag limit changes for each individual species. This comparison is a check point to evaluate the validity of the responses to the CV process. Further discussion of these comparisons will be provided in Section 9.

2.3.2 Size Limit Scenarios

Fisheries management can be designed to reduce the total harvest of a species or to change the age of capture. Bag limits serve the former purpose while size limits serve the latter. Maximum size limits (e.g. no fish greater than 24 inches) are intended to protect adults of a species and thereby achieve desired spawning rates. These limits, however, prevent anglers from keeping large fish that may be desirable for food or trophy display purposes.

Scenarios describing possible changes in maximum size limits were considered in the CV questions. As shown in the second column of Table 2-2, these size limit changes were only for redfish and seatrout since the other near-shore species do not have maximum size restrictions. Each of the trophy fish scenarios were included to evaluate the desirability and measure the marginal economic value of keeping large redfish and seatrout.

The specific size limit changes considered were increases from 0 to 1 and 0 to 2 redfish over the current size limit of 27 inches for redfish. For seatrout, an increase from 1 to 2 fish in the current size limit of 24 inches was considered as well as a decrease from the current limit of 1 to 0 over 24 inches. For increases in the number of trophy redfish and seatrout an angler could keep, the CV scenarios were designed to elicit an angler's willingness to pay for the bag limit increase. In the case of a decrease in keepable trophy seatrout from 1 to 0, the marginal value of avoiding a bag limit reduction was elicited.

2.3.3 Catch Rate Scenarios

Bag limits and size limits control how many of a species an angler can keep on any given day but they do not necessarily change the number of that species that the average angler catches in a day. Increases in bag and size limits give an angler the right to remove more fish from the stock of a species. But, catching more fish does not mean that more fish are removed from the stock since the additional catch can be released. Increases in average catch rates may be more important to anglers than increases in bag or size limits since many anglers may not attain the bag or size limit. Increased catch rates could be achieved through hatchery programs, habitat restoration, reallocations from other users, or other management methods. Thus, the catch rate scenarios were developed to provide values for marginal increases in daily catch for specific species. These scenarios were a response to pre-test comments from respondents who indicated that current bag limits were adequate but they would prefer to catch more fish on any given fishing trip.

For this analysis, 6 hypothetical increases in average catch rates were considered. Referring again to Table 2-2, these catch rate scenarios are numbers 17 to 20 plus 21 and 22. Redfish, seatrout and king mackerel are considered in these scenarios because they are popular recreational target species and they have had relatively low average catch rates in recent years. Average catch rates were computed from MRFSS survey data published by the NMFS. These rates were derived exclusively for the purposes of this survey and may not reflect actual catch rates in any particular part of Florida.

2.4 Contingent Valuation Payment Method

The method of paying for a marginal change in fishery stock availability is an integral part of the CV process. The payment method provides a vehicle for the respondent to express their willingness to pay for the change and, if closely related to existing types of payment for the activity, it can add credibility to the valuation process. Part of the payment method is a clear description of the terms and conditions for payment.

In this study the payment method was a special license stamp. A stamp may be required to possess a specific species or a group of species. The main distinction is that a stamp gives special rights that are not permitted for a general license holder. Stamps have an established precedent in Florida since they are required to possess some marine species (e.g. spiny lobster and snook). Special stamps are also used in fresh water fishing and hunting regulation (the Florida Waterfowl Stamp and the Federal Duck Stamp). Thus, the special license stamp provided a mechanism to elicit willingness to pay for specific changes in existing fishery regulations described in each CV scenario.

In each CV scenario respondents were informed that they would be answering questions designed to elicit their personal value for possible changes in fishery regulations. Then, the current regulations for a given species were described. A change in the regulations was then proposed. The respondent was told that the change could not be applied to all anglers, due to a limited population of each species, so that a special stamp would be required to take advantage of the change. If the stamp was not purchased, the angler could still harvest the species under the existing regulations. Thus, an angler had an explicit incentive to want a stamp if the proposed change was important to them. The respondent was then asked to indicate how much they would be willing to pay for the special stamp which would give them the right to harvest the species under the proposed regulations.

For example, scenario 1 (see Table 2-2 and Form A in Appendix A) describes an increase in the bag limit for redfish from 1 to 2 fish per person (size limits and closed seasons would remain the same). The respondent was then told that they would not be able to harvest at the higher bag limit unless they bought a special redfish stamp. They would still be allowed to harvest 1 fish if they did not buy the stamp. They were then asked to indicate how much they would be willing to pay for this stamp. If they did not want to buy the stamp, they were asked to indicate which of the following reasons explained why they did not want to buy the stamp: 1) they didn't fish for redfish, 2) 1 redfish was all they wanted to keep, 3) they always released all redfish they caught, 4) they didn't believe bag limits were enforced, 5) they just didn't want to pay any more to fish, or 6) they didn't know how much they would pay for 1 more redfish. Thus, in this scenario, as in all the others, respondents could express their willingness to pay for the proposed marginal change in redfish regulations. And, if they did not want to pay for the change, they could indicate a specific reason.

One criticism of the CV process is that respondents' stated willingness to pay may not reflect their true value because no actual payments are required. It is argued that respondents

have no incentive to be truthful. While there is little evidence to support this argument (see Milon 1989 and Mitchell and Carson, Chapter 7 for a discussion of the issues and evidence), it is most likely that this problem would lead to higher values than if payments were actually collected. Thus, the marginal values reported in the following sections may be upwardly biased. It is impossible to determine whether there is any real bias since there are no standards for comparison.

2.5 Sample Disaggregation

One of the advantages of CV surveys is that they provide a measure of each respondent's willingness to pay for the proposed change or the reason why they do not value the change. The distribution of individual responses can be evaluated for the sample as a whole or the sample can be disaggregated into subgroups according to specific characteristics of the respondents. In this study, anglers were classified by three characteristics: by the region of the state where they reside, by fishing mode (shore, boat, etc.), and by target species preferences.

For the purpose of regional classification, 7 regions were defined to include the major estuarine areas and population centers around Florida. These regions are shown in Figure 2-2 and consist of:

1) the Big Bend and Panhandle areas,
2) the Tampa Bay area,
3) the Charlotte Harbor area,
4) Dade County and the Keys,
5) Broward and Palm Beach Counties,
6) the Indian River area, and
7) the St. Johns River area.

Further discussion of the counties included in each region and other aspects of the regional classification are provided in the companion report cited in Section 2.1 above.

Fishing mode classifications were made according to whether the respondent owned a boat or not. This distinction may be important because boat ownership may reflect more commitment to sport fishing, more flexibility to target different species, and possibly higher household income. These factors may influence an angler's willingness to pay for proposed catch regulations. Also, under Florida law, individuals who fish from a boat are required to have a saltwater fishing license unless they satisfy one of the criteria for an exemption (e.g. over 65 years of age, armed forces member, or disabled). Since all of the CV scenarios use a special license stamp as the payment method, anglers who are already accustomed to paying for a license may be more receptive to the idea of a special license stamp. Other anglers who have not purchased a license may be confused by the license stamp payment method and reflect this confusion by indicating they would not pay for a stamp. Thus, in order to understand all anglers' responses to the CV scenarios, the results reported in the following sections are evaluated by boat ownership status.

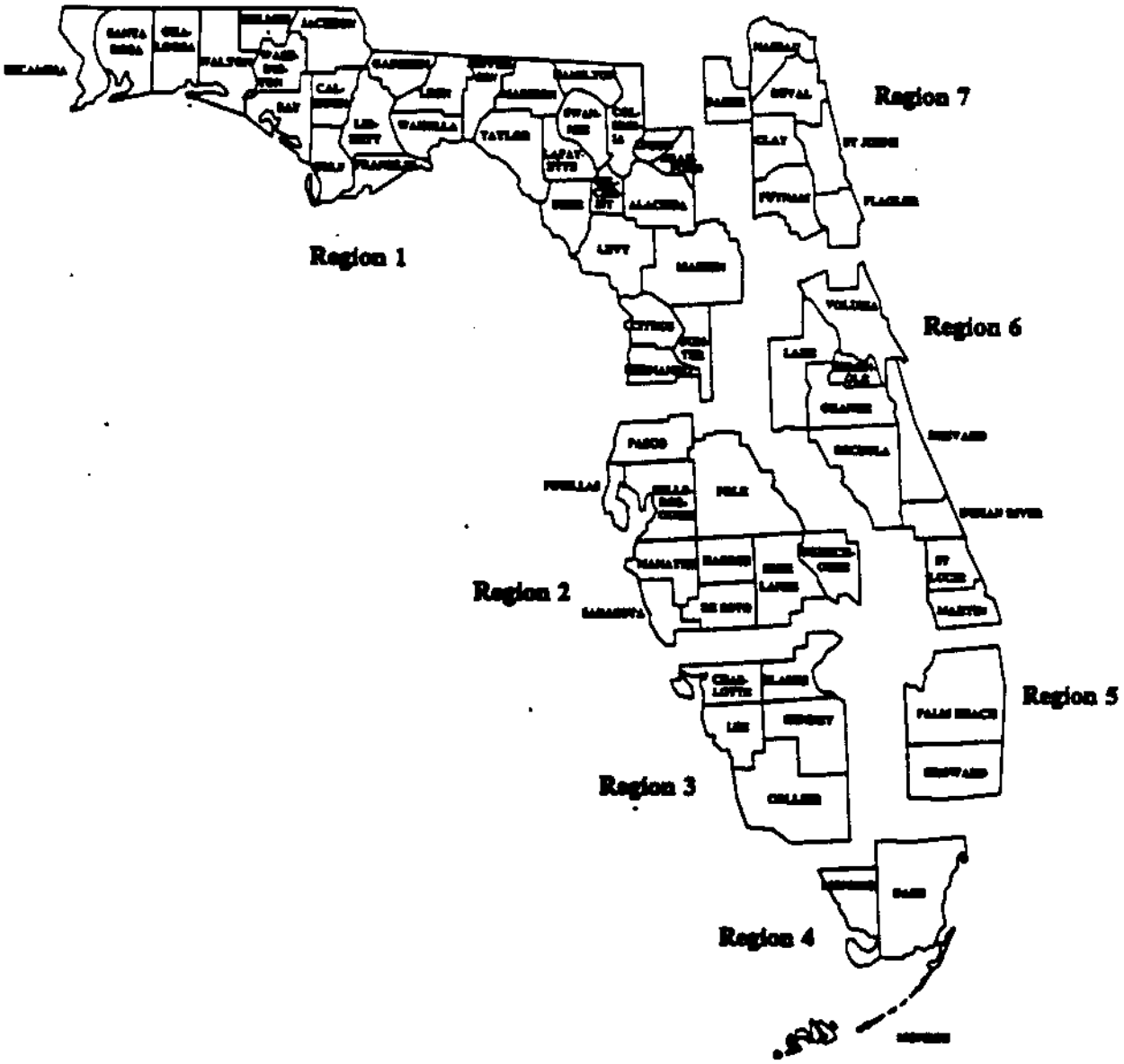

Figure 2-2. Classification of Study Regions

Another aspect of anglers' behavior that may influence responses to CV scenarios is an angler's preferences for certain species groups. Anglers who regularly target near-shore species such as redfish and seatrout would be very interested in changes in catch regulations. On the other hand, anglers who target offshore species such as billfish may have little interest in near-shore species regulations. Respondents in the UF Angler Survey were asked to indicate the percent of their total fishing time they spent targeting 5 different species groups (see Questions 2-1 and 2-2 in Appendix 2). These groups were aggregated into 3 target species groups (offshore, near-shore, and bottom fish). Anglers were then classified into 1 of the 3 groups based on the group which they gave the highest percent of their fishing time. Results from the CV scenarios are also reported according to these species group preferences.

2.6 Statistical Tests

One final aspect of the methodology in this study is the statistical testing procedure to identify differences between responses to comparable CV scenarios. For example, some respondents were asked their willingness to pay for an increase in redfish bag limits from 1 to 2 fish (Scenario 1 in Table 2-2) while others were asked to value an increase from 1 to 3 redfish (Scenario 2). An important issue is whether the mean (average) response to these scenarios is the same for the total sample, or for different subgroups as described above. If the mean responses are not statistically different, this would indicate that anglers who responded in this survey did not assign a higher value to a higher bag limit. Such a result would suggest that there would be no marginal value to an increase in the bag limit beyond 2 fish. Other comparisons for redfish and other species are apparent in Table 2-2; each of these will be evaluated in the following sections.

The statistical procedure used to identify differences in pairwise means is the Tukey test (SAS Institute Inc). This is a general test procedure that allows for unequal sample sizes that result from multiple survey forms such as those used in this study. It is important to note that the Tukey test, like all other pairwise comparison tests, cannot determine with perfect certainty that 2 sample means are equal. The statistical test can only indicate that it is not possible to detect a difference between 2 means with the given sample size. Thus, it is possible that another survey, using identical CV scenarios and survey forms, could produce different results about the equality of 2 means.

3. REDFISH

3.1 Average Willingness to Pay for a Marginal Change in Redfish Catch for All Anglers

Willingness to pay for a special redfish license stamp was elicited for three different management alternatives: bag limit changes, catch rate changes, and size limit changes. For the bag limit changes, respondents were given a choice between the current bag limit of one fish per person per day and purchasing a special license stamp that would allow a higher bag. If a stamp was not purchased, the individual would be limited to the current one fish bag. Bag limit changes of two fish per person per day and three fish were presented in different versions of the survey questionnaire (Appendix C, Survey Forms A and C, respectively).

For the catch rate changes, survey respondents were informed that through a management program the current average daily catch for redfish could be increased. However, such programs would not be possible unless recreational fishermen were to purchase a license stamp. The respondent was informed that purchase of a stamp would be voluntary, however, all proceeds from its sale would be dedicated to increasing redfish stocks. Current catch rates for the state were estimated using NMFS intercept survey data. Two scenarios were then constructed: 1) the average daily catch rate would be increased from two fish per trip to three fish, and 2) catch rates would be improved to four fish per trip. The text for these two scenarios is in Appendix C, Survey Forms G and H, respectively.

Current regulations prohibit keeping a redfish greater than 27 inches in length. Anglers' willingness to pay for a special license stamp that would allow possession of a redfish greater than the 27 inch limit was also elicited. The size limit changes were elicited in a manner similar to that of the bag limit changes. Individuals were informed that if they purchased a special redfish "trophy" stamp they would be allowed to keep a specified number of trophy redfish on a daily basis. If they did not purchase the redfish "trophy" stamp, the current size limit would apply. Two different scenarios were constructed: 1) one trophy size redfish per day could be kept (Appendix C, Survey Form A), and 2) two trophy size redfish could be kept (Appendix C, Survey Form C).

Average willingness to pay (averaged over all respondents to each survey form) for each of the three different management changes is presented in Table 3-1. For each pair of management scenarios, a statistical test was performed to determine whether or not the two computed means were different from one another. For example, willingness to pay for a bag limit change of one fish to two fish per day was $1.94 at the state level. For the three fish bag limit, average willingness to pay was $2.87. A statistical test showed that there was no

difference between these two values[1]. This finding may be interpreted as meaning that, on average, there is no difference in anglers' willingness to pay for either a two fish or a three fish daily bag limit for redfish. (See the prior discussion of statistical testing in Section 2.6). Stated another way, willingness to pay for an increase in redfish bag limits is invariant with respect to the level of the change. Thus, the marginal value of a license stamp that would allow a bag limit greater than two fish is zero. A more detailed discussion of each management scenario follows.

Table 3-1. Average Willingness to Pay For Redfish by Management Alternative, Florida and Regions

	Bag Limit			Average Catch			Size Limit		
Region	1 to 2		1 to 3	2 to 3		2 to 4	0 to 1 > 27"		0 to 2 > 27"
Florida	1.94	=	2.87	2.15	=	2.42	1.50	=	2.60
	(9.14)*		(6.27)	(4.00)		(4.23)	(8.83)		(7.09)
Region 1	0.84	=	4.74	2.35	=	2.17	0.66	=	3.79
	(1.75)		(6.87)	(3.30)		(2.88)	(1.64)		(6.90)
2	0.72	=	2.20	2.04	=	1.56	0.68	=	2.52
	(2.30)		(5.65)	(4.37)		(3.33)	(2.32)		(8.82)
3	1.85	=	1.57	1.29	=	4.14	1.76	=	1.71
	(4.59)		(3.23)	(4.21)		(3.96)	(5.09)		(3.34)
4	7.68	=	1.16	0.70	=	1.10	5.38	=	1.16
	(34.10)		(3.83)	(1.96)		(3.55)	(31.48)		(3.83)
5	0.74	=	2.58	2.54	=	2.18	0.74	=	2.09
	(3.00)		(7.92)	(4.12)		(4.45)	(3.00)		(7.53)
6	1.47	=	3.47	2.68	=	3.92	0.63	=	3.42
	(3.51)		(7.22)	(4.18)		(5.82)	(1.85)		(8.14)
7	2.63	=	3.48	3.01	=	2.51	1.78	=	1.82
	(4.82)		(4.45)	(5.18)		(3.78)	(2.84)		(3.37)

* Standard deviation reported in parentheses.

Average willingness to pay for a license stamp to allow a bag limit change of from one fish to two fish per day was $1.94 at the state level and ranged between a low of $0.72 in region 2 to a high of $7.68 in region 4. This large range is due to the variability of individual responses to the valuation questions as illustrated by the standard deviation of 34.10 in region 4. Average values for each region were computed using responses from that region. Since these regional averages are based on a smaller number of observations, a small number of

[1] In Table 3-1 an "equal to" sign (=) is used to denote equivalent averages. In subsequent tables, in this and other chapters, a "not equal to" sign ($\neq$) is used to denote cases where sample averages are not equal to one another. An asterisk (*) is used to denote cases in which no statistical test was performed because the sample size was less than 30.

responses may exert greater influence on average values compared to the state as a whole. Consequently, state level averages will likely be more representative of saltwater recreational angler willingness to pay.

Average willingness to pay for a license stamp that would allow a bag limit change from one to three redfish was $2.87 for the state. Across all regions, willingness to pay for a special license stamp ranged from a low of $1.16 in region 4 to a high of $4.74 in region 1. Economic theory suggests that willingness to pay is positively related to the number of fish that may be kept. However, statistical tests across bag limit changes showed that, on average, respondents did not place a higher value on a management change that would allow a three fish bag than for a two fish bag limit. This outcome was the same for the state and each region.

Average willingness to pay for a license stamp to increase the average daily redfish catch rate from two fish per trip to three fish per trip was $2.15 at the state level and ranged between $0.70 in region 4 to $3.01 in region 7. Average willingness to pay for an increase in the catch rate from two fish to four fish was $2.42 at the state level and ranged between $1.10 in region 4 and $4.14 in region 3. Across all regions, anglers were not willing to pay more for an increase in the redfish catch rate to four fish than they were willing to pay for a catch rate of three fish.

For Florida, willingness to pay for a license stamp to keep a trophy size redfish greater than 27 inches was $1.50 and ranged between $0.63 in region 6 and $5.38 in region 4. Willingness to pay for a special license stamp that would allow an angler to keep two trophy size redfish ranged between a low of $1.16 in region 3 and a high of $3.79 in region 1. Statewide, average willingness to pay for this management alternative was $2.60. A statistical test showed no significant difference between average willingness to pay to keep one trophy redfish and willingness to pay to keep two trophy redfish.

3.1.1 Reasons for Zero Willingness to Pay

Respondents who gave a zero value for any given management change were asked to indicate their reason for that response. The percentages of zero values and the relative distribution of reasons for a zero value are reported in Table 3-2. Across all management scenarios, the percentage of zero values was quite high. For the average catch scenarios, the percentage of zero values was lower than the bag limit and size limit management changes.

Across all management scenarios, the largest percentage of anglers with a zero value for a redfish stamp indicated they did not want to pay any more to fish than they already do. An unwillingness to pay additional money to fish for redfish was expressed by one-third to one-half of all anglers indicating zero willingness to pay. Approximately 25% of all anglers stating a zero bid for a redfish stamp indicated that they did so because they do not fish for redfish. For the bag limit and size limit scenarios between 15 and 25% of all zero bidders indicated that they did not want to keep any more redfish than they already do. A relatively small number of individuals giving zero responses indicated that they did so because they felt that current

regulations were not enforced or that they always release all fish they catch. Similarly, with the exception of the redfish catch rate scenarios, relatively few individuals gave a zero response because they were simply unable to state a bid.

Table 3-2. Reasons for Stating Zero Willingness to Pay for a Redfish Stamp (Percentages)

	Bag Limit		Average Catch		Size Limit	
Reason	1 to 2	1 to 3	2 to 3	2 to 4	0 to 1 > 27"	0 to 2 > 27"
Percentage of Zero Values	81.3	67.1	60.3	60.6	86.4	76.2
Do Not Fish for Redfish	27.5	36.2	23.8	24.5	26.8	31.9
Always Release all Fish	5.3	4.9	NA[a]	NA	4.8	4.9
Do Not Want to Keep any More Fish	16.4	16.6	NA	NA	15.8	24.2
Already Catch Enough Fish	NA[a]	NA	6.6	6.5	NA	NA
Current Regulations are not Enforced	3.2	2.5	NA	NA	2.4	2.7
Do Not Want to Pay More to Fish	39.2	34.4	53.0	52.5	37.8	30.2
Do Not Know the Value of the Proposed Change	8.5	5.5	16.6	16.5	12.4	6.0

[a] NA = Not Applicable

3.2 Average Willingness to Pay for Marginal Changes in Redfish Catch By Boat Ownership

Unless otherwise exempted, an individual must hold a saltwater fishing license if fishing from a boat. Thus, boat owners may be more likely to have already purchased a saltwater fishing license and feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns, particularly with respect to income, were one of the reasons for various exemptions provided under the legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for changes in redfish management policy were hypothesized to differ between boat owners and people that did not own a boat.

3.2.1 Average Willingness to Pay for Bag Limit Changes by Boat Ownership Status

Table 3-3 shows that at the state level, average willingness to pay for a two redfish bag limit was $2.30 for boat owners and $1.39 for all other anglers. Among boat owners, average willingness to pay ranged from a low of $0.37 in region 2 to a high of $9.78 in region 4. Similarly, willingness to pay by all others ranged between $0.25 in region 3 and $3.92 in region

7. A comparison between boat and all other anglers, however, showed no statistically significant difference in willingness to pay on the basis of boat ownership. No statistical test for regions 3, 4 and 5 were conducted due to insufficient sample size. This finding means that, on average, boat owners were not willing to pay more for a two redfish bag limit than anglers that did not own a boat, and vice versa.

Willingness to pay for a license stamp to keep up to three redfish per day averaged $2.82 for boat owners and $2.96 for all others on a statewide basis. On a regional basis, boat owner willingness to pay for a three fish bag limit ranged between $1.44 in region 4 and $4.64 in region 5. For all other anglers, willingness to pay for the same management change ranged from a high of $6.03 in region 7 to a low of $0.00 in regions 3 and 4. Statistical tests comparing average willingness to pay between boat owners and all others indicate that, on average, boat owners were not willing to pay more for a three redfish bag limit than other anglers, and vice versa. Statistical tests for regions 3, 4, and 5 were not conducted due to inadequate sample sizes.

Table 3-3. Average Willingness to Pay for Redfish Bag Limit Alternatives by Boat Owners and All Other Anglers, Florida and Regions

		1 to 2 Redfish			1 to 3 Redfish		
Region		Boat Owners		All Others	Boat Owners		All Others
Florida		2.30	=	1.39	2.82	=	2.96
		(11.38)*		(3.78)	(6.29)		(6.26)
Region	1	1.03	=	0.49	4.46	=	5.37
		(1.85)		(1.57)	(7.31)		(5.85)
	2	0.37	=	1.36	1.67	=	2.77
		(1.43)		(3.24)	(3.39)		(7.40)
	3	2.81	*	0.25	2.45	*	0.00
		(5.72)		(0.64)	(3.87)		(0.00
	4	9.78	*	1.07	1.44	*	0.00
		(39.33)		(2.71)	(4.23)		(0.00)
	5	0.55	*	0.90	4.64	*	0.27
		(1.47)		(3.99)	(10.80)		(0.92)
	6	1.10	=	1.86	3.40	=	3.61
		(2.41)		(4.37)	(7.26)		(7.31)
	7	1.76	=	3.92	1.83	*	6.03
		(2.97)		(6.74)	(3.43)		(5.09)

*Standard deviation reported in parentheses.
*Sample size less than 30.

3.2.2 Average Willingness to Pay for Average Catch Changes by Boat Ownership Status

Average willingness to pay for changes in average redfish catch rates by boat ownership status are reported in Table 3-4. Statewide, average willingness to pay for an increase in catch rates from 2 fish to 3 fish per trip was $2.00 for boat owners and $2.41 for all other anglers. On a regional basis, average willingness to pay among boat owners was highest in region 7 ($4.22) and lowest in region 3 ($0.13). For anglers who did not own a boat, willingness to pay for an increase in average catch from 2 to 3 fish ranged between $1.00 in region 4 and $3.83 in region 3. For those cases where a statistical test was possible, average willingness to pay differed between boat and all other anglers only in region 3. In region 3, average willingness to pay by boat owners was $0.13 but was $3.83 by anglers not owning a boat. However, at the state level and across all other regions, there was no difference in average willingness to pay on the basis of boat ownership.

Table 3-4. Average Willingness to Pay for Redfish Average Catch Alternatives by Boat Owners and All Other Anglers, Florida and Regions

	2 to 3 Redfish			2 to 4 Redfish		
Region	Boat Owner		All Others	Boat Owner		All Others
Florida	2.00 (4.29)[a]	=	2.41 (3.51)	2.32 (4.08)	=	2.54 (4.45)
Region 1	2.38 (4.72)	=	2.33 (4.04)	2.47 (2.93)	=	1.64 (2.81)
2	2.15 (4.59)	=	1.77 (1.97)	1.50 (3.20)	=	1.63) 3.51
3	0.13 (0.52)	≠	3.83 (8.01)	3.84 (4.27)	*	4.73 (3.46)
4	0.64 (1.50)	*	1.00 (1.41)	0.20 (0.86)	*	2.02 (4.74)
5	2.19 (2.83)	*	3.33 (3.84)	2.68 (3.85)	*	1.98 (4.80)
6	2.79 (5.39)	=	2.56 (3.69)	3.30 (5.69)	=	4.73 (6.00)
7	4.22 (8.06)	=	1.92 (3.63)	2.67 (4.08)	*	1.85 (2.35)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

For an increase in redfish catch rates from 2 to 4 fish, average willingness to pay among boat owners was $2.32 for the state and ranged from a low of $0.20 in region 4 to a high of $3.84 in region 3. Average willingness to pay among all other anglers at the state level was $2.54 and ranged across all regions from $1.63 in region 2 to $4.73 in regions 3 and 6. In Florida, and across all regions, statistical tests show that there once again was no difference in average willingness to pay for a change in redfish catch rates from 2 to 4 fish.

3.2.3 Average Willingness to Pay for Size Limit Changes by Boat Ownership Status

Average willingness to pay to keep a trophy size redfish by boat ownership status is reported in Table 3-5. For boat owners, average willingness to pay to keep 1 redfish over 27 inches was $1.85 at the state level and ranged between $0.29 and $8.50 across all regions. For all other anglers, average willingness to pay for a license stamp to keep 1 redfish over 27 inches was $0.98 at the state level and ranged between $0.00 and $2.22 across all regions. Statistical tests indicated that at the state level there was no difference in average willingness to pay for

Table 3-5. Average Willingness to Pay for Trophy Redfish by Boat Owners and All Other Anglers, Florida and Regions

		0 to 1 > 27"			0 to 2 > 27"		
Region		Boat Owners		All Others	Boat Owners		All Others
Florida		1.85 (11.18)[a]	=	0.98 (2.72)	2.20 (5.86)	=	3.28 (8.88)
Region	1	0.51 (1.30)	=	0.94 (2.16)	2.08 (4.19)	≠	7.80 (10.59)
	2	0.29 (1.34)	≠	1.36 (3.29)	1.11 (2.83)	=	4.03 (12.29)
	3	2.59 (6.32)	*	0.25 (0.64)	2.47 (3.88)	*	0.00 (0.00)
	4	8.50 (39.60)	*	0.00 (0.00)	1.44 (4.23)	*	0.00 (0.00)
	5	0.55 (1.47)	*	0.90 (3.99)	3.95 (10.39)	*	0.00 (0.00)
	6	0.31 (1.03)	=	0.99 (2.42)	3.62 (9.07)	=	3.01 (5.98)
	7	1.51 (2.42)	=	2.22 (3.51)	1.12 (2.36)	*	2.95 (4.53)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

a redfish trophy stamp on the basis of boat ownership. The same may be said on a regional basis with the exception of region 2 where all other anglers were willing to pay more to keep a trophy redfish ($1.36 vs. $0.29) than their boat owning counterparts.

Willingness to pay to keep 2 trophy size redfish averaged $2.20 at the state level for boat owners and $3.28 for all others. However, there was no statistical difference in average willingness to pay on the basis of boat ownership. On a regional basis, average willingness to pay to keep 2 trophy size redfish ranged between $1.11 and $3.95 for boat owners and between $0.00 and $7.80 for all others. A test to determine whether average willingness to pay differed between boat owners and anglers not owning a boat was only possible in regions 1, 2, and 6 due to insufficient sample sizes in regions 3, 4, 5, and 7. Region 1 was the only region where average willingness to pay to keep 2 trophy size redfish differed on the basis of boat ownership with all other anglers willing to pay more, on average, than boat owners.

3.3 Average Willingness to Pay for Marginal Changes in Redfish Catch By Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the survey, species targeting preferences were elicited by asking each angler what percentage of time (of their total time spent fishing) they spent targeting specific groups of species. Species groups were determined by similarities in habitat and range. These species groups were: reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as the preferred species group for that particular angler.

The species valuation questions focused on species in the near-shore bottomfish group (i.e. redfish, seatrout, mullet, sheepshead, and pompano) and on king mackerel (the offshore small game species group). It was hypothesized that, on average, willingness to pay for a higher bag limit (catch rate or size limit) would be greater for anglers who primarily targeted near-shore species as compared to anglers who primarily targeted other species groups. To test this hypothesis, the species groups defined in the survey were aggregated into three groups: a near-shore bottomfish group, an offshore group (both big and small game) and all others (i.e. a combination of reef fish, inshore game, and other species groups). Next, pair-wise statistical tests of average willingness to pay for each species group were made to test the hypothesis that average willingness to pay for a redfish license stamp to fund alternative management changes differed by species group targeting preferences.

3.3.1 Average Willingness to Pay for Bag Limit Changes by Targeting Preferences

A comparison between average willingness to pay for the species preference pairings of near-shore/offshore, offshore/all others, and near-shore/all others is reported in Table 3-6 for a 2 fish bag limit scenario. On a statewide basis, average willingness to pay for a special license stamp was $0.96 for near-shore anglers, $7.65 for offshore anglers, and $1.39 for anglers targeting all other species groups. Due to the number of categories created in Table 3-6, regional analysis of average willingness to pay is difficult due to the relatively small number of observations in each cell. Cells in which there are no observations are denoted by dashed lines (- -) and cells in which there is only one observation or all observations are the same have a sample variance of zero. Considering only those cases where the sample variance was greater than zero, average willingness to pay for a license stamp ranged from $1.23 and $2.89 for near-shore anglers, $2.20 and $3.24 for offshore anglers, and $0.68 and $5.66 for anglers targeting all other species groups.

Tests for differences in average willingness to pay by species group preferences showed no difference in willingness to pay across all possible combinations of regional and species targeting preference. This finding means that, on average, willingness to pay for a special license stamp allowing the holder to keep up to 2 redfish per day is the same regardless of species targeting preferences.

Table 3-6. Average Willingness to Pay for Redfish Bag Limit Alternatives by Species Group Preferences, Florida and Regions (1 to 2 Redfish)

		1 to 2 Redfish								
Region		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		0.96 (2.36)[a]	=	7.65 (28.13)	7.65 (28.13)	=	1.39 (3.83)	0.96 (2.36)	=	1.39 (3.83)
Region	1	1.20 (2.04)	=	0.00 (0.00)	0.00 (0.00)	*	0.99 (1.96)	1.20 (2.04)	=	0.99 (1.96)
	2	0.00 (0.00)	*	- -	- -	*	0.91 (2.27)	0.00 (0.00)	=	0.91 (2.27)
	3	2.89 (6.02)	*	- -	- -	*	0.68 (1.40)	2.89 (6.02)	*	0.68 (1.40)
	4	3.00 (0.00)	*	100.00 (0.00)	100.00 (0.00)	*	1.36 (4.87)	3.00 (0.00)	*	1.36 (4.87)
	5	- -	*	0.00 (0.00)	0.00 (0.00)	*	1.44 (4.01)	- -	*	1.44 (4.01)
	6	1.49 (2.20)	*	3.24 (5.18)	3.24 (5.18)	*	1.35 (4.11)	1.49 (2.20)	=	1.35 (4.11)
	7	1.23 (2.56)	*	2.20 (2.22)	2.20 (2.22)	*	5.66 (7.98)	1.23 (2.56)	*	5.66 (7.98)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay for 3 redfish per person per day by region and species targeting preference is reported in Table 3-7. On a state-wide basis, average willingness to pay was $3.77 for anglers targeting near-shore species, $1.26 for anglers targeting offshore species, and $2.61 for anglers targeting all other species groups. As was the case for Table 3-6 there are several cells in Table 3-7 in which there are less than two observations from which average willingness to pay could be calculated. Considering only those cells with sample variance greater than zero, average willingness to pay across all regions ranged between $1.00 and $5.79 for near-shore anglers, $0.85 and $4.04 for offshore anglers, and $0.82 and $5.47 for anglers targeting all other species. Statistical tests indicated that, on average, willingness to pay for 3 redfish was the same regardless of species targeting preferences.

Table 3-7. Average Willingness to Pay for Redfish Bag Limit Alternatives by Species Group Preferences, Florida and Regions (1 to 3 Redfish)

		1 to 3 Redfish							
Region		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		3.77 (7.04)[a]	=	1.26 (3.81)	1.26 (3.81)	=	2.61 (6.44)	3.77 (7.04)[a]	=	2.61 (6.44)
Region	1	5.79 (8.58)	*	4.04 (6.59)	4.04 (6.59)	*	3.42 (4.94)	5.79 (8.58)	=	3.42 (4.94)
	2	4.15 (9.15)	*	- -	- -	*	0.82 (2.11)	4.15 (9.15)	=	0.82 (2.11)
	3	1.00 (1.26)	*	- -	- -	*	2.01 (3.77)	1.00 (1.26)	*	2.01 (3.77)
	4	0.00 (0.00)	*	0.85 (2.79)	0.85 (2.79)	*	1.56 (4.79)	0.00 (0.00)	*	1.56 (4.79)
	5	- -	*	0.00 (0.00)	0.00 (0.00)	*	2.86 (9.22)	- -	*	2.86 (9.22)
	6	2.43 (4.30)	*	1.99 (3.47)	1.99 (3.47)	*	5.47 (10.76)	2.43 (4.30)	=	5.47 (10.76)
	7	3.44 (3.80)	*	0.00 (0.00)	0.00 (0.00)	*	4.64 (5.67)	3.44 (3.80)	*	4.64 (5.67)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

3.3.2 Average Willingness to Pay for Catch Rate Changes by Targeting Preferences

Average willingness to pay for a special license stamp to increase the average catch rate of redfish from 2 fish per trip to 3 fish by species targeting preferences is reported in Table 3-8. On a state-wide basis, average willingness to pay was $2.93 for near-shore anglers, $1.57 for offshore anglers, and $2.23 for anglers targeting all other species groups. On a regional basis, considering only those cases where the sample variance was greater than zero, average willingness to pay ranged between $1.86 and $4.07 for near-shore anglers, $0.26 and $2.25 for offshore anglers, and $0.22 and $3.51 for all other anglers. Across all regions and species preference comparisons, no difference in willingness to pay was detected.

Table 3-8. Average Willingness to Pay for Redfish Average Catch Alternatives by Species Group Preferences, Florida and Regions (2 to 3 Redfish)

Region		2 to 3 Redfish Per Trip								
		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		2.92 (4.83)[a]	=	1.57 (3.07)	1.57 (3.07)	=	2.23 (4.06)	2.92 (4.83)	=	2.23 (4.06)
Region	1	3.23 (3.96)	=	1.85 (3.46)	1.85 (3.46)	*	1.63 (2.27)	3.23 (3.96)	*	1.63 (2.27)
	2	1.86 (2.48)	*	1.60 (2.43)	1.60 (2.43)	=	2.45 (5.67)	1.86 (2.48)	=	2.45 (5.67)
	3	2.80 (6.33)	*	0.00 (0.00)	0.00 (0.00)	*	0.22 (0.76)	2.80 (6.33)	*	0.22 (0.76)
	4	0.00 (0.00)	*	0.26 (0.68)	0.26 (0.68)	*	0.92 (2.30)	0.00 (0.00)	*	0.92 (2.30)
	5	- -	*	2.25 (4.68)	2.25 (4.68)	*	3.51 (4.28)	- -	*	3.51 (4.28)
	6	3.59 (5.75)	*	1.99 (2.28)	1.99 (2.28)	=	2.76 (3.39)	3.59 (5.75)	=	2.76 (3.39)
	7	4.07 (7.67)	*	0.65 (1.00)	0.65 (1.00)	*	3.47 (3.77)	4.07 (7.67)	*	3.47 (3.77)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay for an increase in the average catch rate of redfish from 2 fish per trip to 4 fish by species targeting preferences is reported in Table 3-9. On a statewide basis average willingness to pay was $3.07 for near-shore anglers, $3.80 for offshore anglers, and $1.89 for anglers targeting all other species groups. On a regional basis, considering only those cases where the sample variance exceeds zero, average willingness to pay ranged between $1.29 and $5.58 for near-shore anglers, $0.75 and $12.69 for offshore anglers, and $1.18 and $4.36 for all other anglers. On a state-wide basis, anglers targeting offshore species were willing to pay more, on average, than anglers targeting preferences other species groups.

Table 3-9. Average Willingness to Pay for Redfish Average Catch Alternatives by Species Group Preferences, Florida and Region (2 to 4 Redfish)

Region		2 to 4 Redfish Per Trip								
		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		3.07 (4.69)[a]	=	3.80 (6.16)	3.80 (6.16)	≠	1.89 (3.13)	3.07 (4.69)	=	1.89 (3.13)
Region	1	3.52 (3.30)	=	0.75 (1.45)	0.75 (1.45)	*	1.28 (2.77)	3.52 (3.30)	=	1.28 (2.77)
	2	1.29 (3.11)	*	2.74 (3.99)	2.74 (3.99)	*	1.56 (3.31)	1.29 (3.11)	*	1.56 (3.31)
	3	1.70 (2.07)	*	12.69 (3.31)	12.69 (3.31)	*	4.36 (3.40)	1.70 (2.07)	*	4.36 (3.40)
	4	0.00 (0.00)	*	2.24 (3.51)	2.24 (3.51)	*	1.18 (4.06)	0.00 (0.00)	*	1.18 (4.06)
	5	0.00 (0.00)	*	2.76 (6.16)	2.76 (6.16)	*	2.09 (3.13)	0.00 (0.00)	*	2.09 (3.13)
	6	5.58 (6.88)	=	7.13 (9.30)	7.13 (9.30)	=	1.85 (2.41)	5.58 (6.88)	=	1.85 (2.41)
	7	2.56 (4.27)	*	3.23 (4.02)	3.23 (4.02)	*	1.95 (2.03)	2.56 (4.27)	*	1.95 (2.03)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

3.3.3 Average Willingness to Pay for Redfish Size Limit Changes by Species Targeting Preferences

Average willingness to pay for a trophy redfish (i.e. greater than 27 inches) is reported in Table 3-10. At the state level, average willingness to pay was $0.88 for anglers targeting near-shore bottomfish, $6.73 for anglers preferring offshore species, and $0.79 for anglers preferring all other species groups. Statistical tests showed that, on average, willingness to pay for a trophy redfish was greater for offshore anglers than both near-shore anglers and anglers targeting all other species groups.

On a regional basis, considering only those cells with a nonzero sample variance, average willingness to pay ranged from $0.39 to $3.14 for near-shore anglers, $0.27 to $50.46 for offshore anglers, and $0.26 to $2.03 for anglers preferring all other species groups. For those cases where a hypothesis test was possible, no difference in average willingness to pay was found between anglers with different species targeting preferences.

Table 3-10. Average Willingness to Pay for Redfish Size Limit Alternatives by Species Group Preferences, Florida and Region (0 to 1 > 27")

Region		0 to 1 > 27"							
		Near-Shore		Offshore	Offshore		All Others	Near- Shore		All Others
Florida		0.88 (2.62)[a]	≠	6.73 (27.06)	6.73 (27.06)	≠	0.79 (2.42)	0.88 (2.62)[a]	=	0.79 (2.42)
Region	1	0.62 (1.50)	=	0.27 (0.55)	0.27 (0.55)	*	1.25 (2.41)	0.62 (1.50)	=	1.25 (2.41)
	2	0.39 (2.01)	*	--	--	*	0.90 (2.64)	0.39 (2.01)	=	0.90 (2.64)
	3	3.14 (7.34)	*	--	--	*	0.26 (0.59)	3.14 (7.34)	*	0.26 (0.59)
	4	0.00 (0.00)	*	50.46 (96.64)	50.46 (96.64)	*	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)
	5	--	*	0.00 (0.00)	0.00 (0.00)	*	1.44 (4.01)	--	*	1.44 (4.01)
	6	0.74 (1.71)	*	0.00 (0.00)	0.00 (0.00)	*	0.72 (2.13)	0.74 (1.71)	=	0.72 (2.13)
	7	1.23 (2.56)	*	1.56 (2.49)	1.56 (2.49)	*	2.03 (3.30)	1.23 (2.56)	*	2.03 (3.30)

[a]Standard deviation reported in parentheses.
[b]Sample size less than 30.

Average willingness to pay to keep 2 trophy redfish is reported in Table 3-11. At the state level, average willingness to pay was $2.05 for anglers targeting near-shore bottomfish, $1.00 for anglers preferring offshore species, and $3.40 for anglers preferring all other species groups. Statistical tests showed that, on average, willingness to pay for 2 trophy redfish was less for offshore anglers than near-shore anglers and anglers preferring all other species groups; while no difference was found between anglers preferring near-shore versus all other species groups.

On a regional basis, considering only those cells where the sample variance was greater than zero, average willingness to pay ranged from $0.60 to $3.03 for near-shore anglers, $0.85 to $3.50 for offshore anglers, and $1.56 to $6.84 for anglers preferring all other species groups. In most instances, there were not enough observations to test for differences in average willingness to pay across species targeting preferences. For those cases where a test was possible, no difference in average willingness to pay was found.

Table 3-11. Average Willingness to Pay for Redfish Size Limit Alternatives by Species Group Preferences, Florida and Region (0 to 2 > 27")

		0 to 2 > 27"							
Region		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		2.05 (4.77)[a]	≠	1.00 (2.60)	1.00 (2.60)	≠	3.40 (9.38)	2.05 (4.77)	=	3.40 (9.38)
Region	1	3.03 (4.98)	=	0.00 (0.00)	0.00 (0.00)	*	4.22 (8.62)	3.03 (4.98)	=	4.22 (8.62)
	2	2.33 (6.92)	=	--	--	*	2.79 (11.12)	2.33 (6.92)	=	2.79 (11.12)
	3	1.00 (1.26)	*	--	--	*	2.25 (3.95)	1.00 (1.26)	*	2.25 (3.95)
	4	0.00 (0.00)	*	0.85 (2.79)	0.85 (2.79)	*	1.56 (4.79)	0.00 (0.00)	*	1.56 (4.79)
	5	--	*	0.00 (0.00)	0.00 (0.00)	*	2.65 (9.29)	--	*	2.65 (9.29)
	6	1.97 (4.27)	*	2.50 (3.50)	2.50 (3.50)	*	6.84 (12.89)	1.97 (4.27)	=	6.84 (12.89)
	7	0.60 (1.28)	*	0.00 (0.00)	0.00 (0.00)	*	3.18 (4.58)	0.60 (1.28)	*	3.18 (4.58)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

3.4 Summary

The preceding analysis of the marginal value of changes in redfish catch regulations showed that willingness to pay for a change in the current bag limit to two fish per person per day was $1.94 at the state level and ranged between $0.72 and $7.68 across all regions. Statistical tests indicated no difference in average willingness to pay between a two fish bag limit change and a three fish bag. This finding means that, on average, the economic value of keeping more than two redfish is zero. Further analysis of the bag limit changes indicated that average willingness to pay was not affected by whether the angler owned a boat or the angler's species group targeting preferences.

For changes in average daily catch rates from two to three fish per trip, average willingness to pay was $2.15 for the state and ranged from $3.01 to $0.70 across all regions. However, as was the case for the bag limit changes, no differences in average values were found between the three fish catch rate and a four fish catch rate. Also, no differences in average values were found on the basis of boat ownership or species targeting preferences.

Average willingness to pay to keep one or more trophy size redfish was $1.50 for the state and ranged between $0.63 and $5.38 across all regions. No difference in willingness to pay was found between management changes that would allow keeping one and two fish

respectively. Further, no difference was found in willingness to pay for a redfish trophy stamp on the basis of boat ownership or species group targeting preferences.

The statistical results indicated that recreational anglers did place an economic value on marginal changes in redfish catch regulations. However, the values for specific changes were not well defined and varied considerably across respondents. The pattern of variation did not depend upon factors that would be expected to influence willingness to pay such as target species preferences and boat ownership.

In addition, there was a high percentage of respondents who gave zero willingness to pay. This finding does not mean that respondents did not place any economic value on catching redfish. Rather, it means that these anglers placed no value on the particular management changes that were presented. They were generally satisfied with the existing catch regulations and were not willing to pay more to catch or keep more redfish. However, standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero willingness to pay, there were some respondents who placed a high value on the proposed changes.

4. SEATROUT

4.1 Average Willingness to Pay for Marginal Changes in Seatrout Catch for All Anglers

Like the previous analysis, willingness to pay for a special seatrout license stamp was elicited for three different management alternatives: bag limit changes, catch rate changes, and size limit changes. For the bag limit changes, respondents were given a choice between the current bag limit of 10 fish per person per day and purchasing a special license stamp that would allow a higher bag. If a stamp was not purchased, the individual would be limited to the current 10 fish bag. Bag limit changes of 15 fish per person per day and 20 fish were presented in different versions of the survey questionnaire (Appendix C: Survey Forms B and D respectively).

For the catch rate changes, survey respondents were informed that through a management program the current average daily catch for seatrout could be increased. However, such programs would not be possible unless recreational fishermen were to purchase a license stamp. The respondent was informed that purchase of a stamp would be voluntary, however, all proceeds from its sale would be dedicated to increasing seatrout stocks. Current catch rates for the state were estimated using NMFS intercept survey data. Two scenarios were then constructed: 1) the average daily catch rate would be increased from three fish per trip to five fish, and 2) average daily catch rates would be improved to seven fish per trip. The text for these two scenarios is found in Appendix C: Survey Forms G and H respectively.

Current regulations allow keeping one seatrout greater than 24 inches in length. Anglers willingness to pay for a special license stamp that would allow possession of two seatrout greater than the 24 inch limit was elicited. An additional scenario was also constructed in which respondents were informed that it would not be possible to keep any seatrout greater than 24 inches unless a special license stamp were purchased. If such a stamp were purchased the holder would be allowed to keep one seatrout in excess of 24 inches. This latter scenario differs from that used for any of the redfish and other seatrout scenarios in that something is being taken away and payment is elicited to restore the individual to his/her former position. In this case the ability to keep one large seatrout is removed and the individual is asked to "buy back" the right to keep one seatrout greater than 24 inches in length. The size limit changes were elicited in a manner similar to the bag limit changes. Individuals were informed that if they purchased a special seatrout "trophy" stamp, they would be allowed to keep a specified number of large seatrout on a daily basis. If they did not purchase the "trophy" stamp then the current size limit would apply. The two scenarios that were constructed are described in Appendix C: Survey Forms B and D.

The computed average willingness to pay for each of the three management changes is presented in Table 4-1. For each pair of management scenarios a statistical test was performed to determine whether or not the two means were different from one another. For example, willingness to pay for a bag limit change of from 10 fish to 15 fish per day was $1.36 at the

state level. For the 20 fish bag limit, average willingness to pay was $1.16. A statistical test showed no difference between these two values. This finding means that, on average, there is no difference in willingness to pay for either a 15 fish or a 20 fish daily bag limit for seatrout. Stated another way, willingness to pay for an increase in seatrout bag limits by five or more fish is invariant with respect to the level of the change. The marginal value of a license stamp that would allow a bag limit greater than 15 fish is zero. A more detailed discussion of each of the management scenarios follows.

Table 4-1. Average Willingness to Pay for Seatrout by Management Alternative, Florida and Regions

Region	Bag Limit		Average Catch		Size Limit	
	10 to 15	10 to 20	3 to 5	3 to 7	0 to 1 > 24"	1 to 2 > 24"
Florida	1.36	1.16	1.74	1.67	1.35	1.36
	(4.11)*	(4.28)	(4.04)	(3.65)	(3.89)	(4.33)
Region 1	1.18	0.74	1.82	1.28	1.20	0.31
	(2.76)	(2.38)	(3.04)	(2.02)	(3.04)	(0.87)
2	1.43	1.28	1.42	0.79	0.94	1.50
	(4.68)	(4.19)	(4.00)	(2.62)	(2.10)	(3.77)
3	1.15	1.62	0.89	1.49	2.25	1.47
	(2.72)	(3.63)	(3.32)	(2.38)	(7.28)	(3.65)
4	2.55	1.18	1.62	1.00	1.57	1.31
	(9.53)	(4.21)	(4.56)	(3.55)	(7.66)	(4.10)
5	1.78	0.42	2.21	1.81	2.01	0.16
	(6.59)	(1.68)	(6.23)	(4.42)	(5.09)	(0.65)
6	0.73	0.68	2.39	3.47	1.46	1.56
	(1.96)	(2.17)	(4.67)	(5.44)	(2.64)	(3.45)
7	0.67	3.04	0.95	1.30	0.48	3.29
	(1.44)	(9.33)	(2.17)	(2.32)	(1.23)	(9.35)

* Standard deviation reported in parentheses.

Average willingness to pay for a bag limit change from 10 to 15 seatrout per day was $1.36 at the state level and ranged between a low of $0.73 in region 6 to a high of $2.55 in region 4. As was the case for redfish, average willingness to pay across management scenarios and regions exhibited substantial variability. This variability is due to the fact that the average values for each region were computed using responses from a given region. Since these regional averages are based on a smaller number of observations, a small number of responses may exert greater influence on average values as compared to the state as a whole. Consequently, state level averages will be more representative of saltwater recreational angler willingness to pay.

Average willingness to pay for a bag limit change from 10 to 20 seatrout was $1.16 for the state. Across all regions, willingness to pay ranged from a low of $0.42 in region 5 to a high of $3.04 in region 7. Economic theory suggests that willingness to pay is positively related to the number fish that may be kept. However, statistical tests across bag limit changes showed

that, on average, respondents placed no more value on a management change that would allow a 15 fish bag than for a 20 fish bag limit.

Average willingness to pay for an increase in the average daily catch rate for seatrout from 3 fish per trip to 5 fish per trip was $4.17 at the state level and ranged between $0.89 in region 3 to $2.39 in region 6. Average willingness to pay for an increase in the catch rate from 3 fish to 7 fish was $1.67 at the state level and ranged between $0.79 in region 2 and $3.47 in region 6. Across all regions, anglers were not willing to pay more for an increase in the seatrout catch rate from 3 to 5 fish than they were willing to pay for an increased catch rate of 3 to 7 fish.

For Florida, willingness to pay for a trophy seatrout was $1.35 for one seatrout greater than 24 inches and ranged between $0.48 in region 7 and $2.25 in region 3. Average willingness to pay for a special license stamp to keep two trophy size fish ranged between a low of $0.16 in region 5 and a high of $3.29 in region 7. Statewide, average seatrout willingness to pay for this management alternative was $1.36. A statistical test showed no significant difference between average willingness to pay to keep one or two trophy seatrout.

4.1.1 Reasons for Zero Willingness to Pay for All Anglers

Respondents who gave a zero willingness to pay for any proposed management change were asked to indicate their reason for stating such a bid. The percentage of zero values and the relative distribution of reasons for zero values for seatrout is reported in Table 4-2. Across all management scenarios, the percentage of zero values was quite high (approximately 80%). For the average catch scenarios, the percentage of zero values was lower than for the bag limit and size limit management changes.

For the bag limit changes, the largest percentage of anglers with a zero value indicated they did not want to keep any more fish than they already did. Approximately one-third of the respondents indicated that they did not fish for seatrout and slightly more than 20 percent indicated a zero value because they did not want to pay any more to fish than they already did. For the average catch alternatives, the majority of individuals

Table 4-2. Reasons for Stating Zero Willingness to Pay for a Seatrout Stamp (Percentages)

	Bag Limit		Average Catch		Size Limit	
Reason	10 to 15	10 to 20	3 to 5	3 to 7	0 to 1 > 24"	1 to 2 > 27"
Percentage of Zero Values	84.7	86.5	71.1	71.9	79.9	79.1
Do Not Fish for Seatrout	32.3	29.6	30.9	24.0	34.0	33.2
Always Release all Fish	4.4	3.0	NA*	NA	5.2	2.8
Do Not Want to Keep any More Fish	38.9	42.9	NA	NA	18.4	23.8
Already Catch Enough Fish	NA*	NA	10.3	13.8	NA	NA
Current Regulations are not Enforced	2.7	1.3	NA	NA	2.8	3.7
Do Not Want to Pay More to Fish	20.4	22.3	49.1	49.1	33.5	32.2
Do Not Know the Value of the Proposed Change	1.3	0.9	9.7	13.2	6.1	4.2

*NA = Not Applicable

stating a zero value indicated they did not want to pay any more to fish than they already did. An additional one-third to one-fourth of respondents indicated a zero value because they did not fish for seatrout. For the catch rate changes, the percentage of individuals stating a zero value were divided approximately equally divided between those that felt that they already catch enough seatrout and those that did not know the value of an increased catch rate. For the size limit changes, one-third of respondents giving a zero value did so because they did not fish for seatrout. Approximately the same number of respondents indicated that they did not want to pay any more to fish than they already did, and an additional 20 percent indicated a zero value because they did not want to keep any more fish. Overall, a relatively small number of individuals giving zero values indicated that they did so because they felt that current regulations were not enforced or that they always release all fish they catch. Similarly, with the exception of the seatrout catch rate scenarios, relatively few individuals gave a zero response because they were simply unable to state a bid.

4.2 Average Willingness to Pay for Marginal Changes in Seatrout Catch By Boat Ownership

Unless otherwise exempt, a Florida resident must hold a saltwater fishing license if fishing from a boat. Thus, boat owners may be more likely to have already purchased a saltwater fishing license and feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns, particularly with respect to income, were one of the primary reasons for various exemptions provided under the

legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for a changes in seatrout management policy were hypothesized to differ among boat owners and all other anglers.

4.2.1 Average Willingness to Pay for Seatrout Bag Limit Changes by Boat Ownership

Table 4-3 shows that at the state level, average willingness to pay for a license stamp allowing a 5 fish bag limit was $1.06 for boat owners and $1.76 for all other anglers. Among boat owners average willingness to pay for 5 seatrout to be kept ranged from a low of $0.34 in region 5 to a high of $3.53 in region 4. Similarly, willingness to pay by all other anglers ranged between $0.64 in region 7 and $2.71 in region 5. A comparison between boat owners and all others, however, showed that in only one instance was there a difference in willingness to pay on the basis of boat ownership. In region 1, anglers who did not own a boat were willing to pay more for a 15 fish bag limit than were boat owners. No statistical test for regions 3, 4, 5, and 7 were conducted due to insufficient sample size.

Table 4-3. Average Willingness to Pay for Seatrout by Bag Limit Alternatives by Boat Owners and All Others Anglers, Florida and Region

		10 to 15			10 to 20		
Region		Boat Owner		All Others	Boat Owner		All Others
Florida		1.06	=	1.76	1.15	=	1.16
		(3.82)[a]		(4.48)	(3.14)		(5.91)
Region	1	0.71	≠	2.13	1.01	=	0.11
		(1.98)		(3.86)	(2.84)		(0.34)
	2	0.61	=	2.42	1.02	=	1.83
		(2.37)		(6.38)	(3.41)		(5.49)
	3	0.91	*	1.45	2.34	*	0.00
		(2.57)		(3.03)	(4.23)		(0.00)
	4	3.53	*	0.72	2.15	*	0.00
		(11.62)		(2.57)	(5.44)		(0.00)
	5	0.34	*	2.71	0.53	*	0.00
		(1.05)		(8.32)	(1.88)		(0.00)
	6	0.47	=	1.13	0.93	=	0.28
		(1.65)		(2.35)	(2.65)		(0.95)
	7	0.70	*	0.64	0.89	=	6.49
		(1.53)		(1.39)	(1.80)		(14.71)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Willingness to pay for a bag limit of 20 seatrout per day averaged $1.15 for boat owners and $1.16 for all other anglers on a state-wide basis. On a regional basis, boat owner willingness to pay for a 20 fish bag limit ranged between $0.53 in region 5 and $2.34 in region 3. For all others willingness to pay for the same management change ranged from a high of $6.49 in region 7 to a low of $0.00 in regions 3, 4, and 5. Statistical tests comparing average willingness to pay between boat owners and all other anglers indicated that, on average, boat owners were willing to pay no more for a 20 seatrout bag limit than all other anglers, and vice versa.

4.2.2 Average Willingness to Pay for Average Catch Changes by Boat Ownership

Average willingness to pay for changes in average catch rates for seatrout by boat ownership are reported in Table 4-4. Statewide, average willingness to pay for an increase in catch rate from 3 to 5 fish per trip was $1.77 for boat owners and $1.70 for all others. On a regional basis, average willingness to pay among boat owners was highest in region 6 ($3.11) and lowest in region 3 ($0.00). For anglers who did not own a boat, willingness to pay varied

Table 4-4. Average Willingness to Pay for Average Catch Alternatives by Boat Owner and All Other Anglers, Florida and by Regions

		3 to 5			3 to 7		
Region		Boat Owner		All Others	Boat Owner		All Others
Florida		1.77 (4.14)[a]	=	1.70 (3.90)	1.39 (3.46)	=	2.01 (3.90)
Region	1	1.92 (4.48)	=	1.71 (3.42)	1.56 (2.15)	=	0.75 (1.72)
	2	1.28 (2.17)	=	1.77 (5.34)	0.93 (2.88)	=	0.66 (2.39)
	3	0.00 (0.00)	*	3.00 (6.71)	1.47 (2.05)	*	1.53 (3.02)
	4	1.29 (2.92)	*	5.00 (7.07)	0.00 (0.00)	*	2.02 (4.74)
	5	2.93 (5.54)	*	1.11 (3.33)	1.82 (3.74)	*	1.81 (4.82)
	6	3.11 (6.66)	=	1.67 (2.79)	2.35 (5.66)	≠	5.12 (4.83)
	7	1.22 (2.17)	*	0.83 (2.89)	1.39 (2.44)	*	0.96 (1.91)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

between $0.00 in region 4 and $5.00 in region 4. For those cases where a statistical test was possible, no difference was found in average willingness to pay on the basis of boat ownership.

For a management change that would increase seatrout catch rates from 3 to 7 fish, average willingness to pay among boat owners was $1.39 for Florida and ranged from a low of $0.00 in region 4 to a high of $2.35 in region 6. For the same management change, average willingness to pay among all other anglers at the state level was $2.01 and ranged across all regions from $0.66 in region 2 to $5.12 in region 6. In Florida and across all regions, statistical tests showed that in only region 6 was there a difference in average willingness to pay for a change in seatrout catch rates on the basis of boat ownership. In region 6 anglers who did not own a boat were willing to pay more, on average, than boat owners.

4.2.3 Average Willingness to Pay for Size Limit Changes by Boat Ownership

Average willingness to pay to keep a trophy size seatrout by boat ownership is reported in Table 4-5. For boat owners, average willingness to pay to keep 1 seatrout over 24 inches was $1.23 at the state level and ranged between $0.00 and $2.48 across all regions. For all others, average willingness to pay to keep 1 seatrout over 24 inches was $1.51 at the state level and ranged between $0.00 and $4.49 across all regions. Statistical tests indicated that at the state level and across all regions, there was no difference in average willingness to pay to keep one seatrout over 24 inches on the basis of boat ownership.

Willingness to pay to keep 2 trophy size seatrout averaged $1.28 at the state level for boat owners and $1.51 for anglers not owning a boat. A statistical test indicated that there was no difference in average willingness to pay. On a regional basis, average willingness to pay to keep 2 trophy seatrout ranged between $0.20 and $2.31 for boat owners and between $0.00 and $8.01 for all others. In only region 7 was average willingness to pay to keep 2 trophy seatrout different for anglers who did not own a boat as compared to boat owners.

Table 4-5. Average Willingness to Pay for Seatrout Size Limit Alternatives by Boat Owner and All Other Anglers, Florida and Regions

Region		0 to 1 > 24"			1 to 2 > 24"		
		Boat Owner		All Others	Boat Owner		All Others
Florida		1.23	=	1.51	1.28	=	1.51
		(3.66)[a]		(4.21)	(2.90)		(6.30)
Region	1	1.28	=	1.04	0.26	=	0.42
		(3.03)		(3.13)	(0.84)		(0.95)
	2	0.52	=	1.50	1.42	=	1.68
		(1.52)		(2.62)	(3.03)		(5.09)
	3	0.33	*	4.49	2.30	*	0.00
		(0.79)		(10.69)	(4.42)		(0.00)
	4	2.48	*	0.00	2.31	*	0.00
		(9.51)		(0.00)	(5.11)		(0.00)
	5	1.78	*	2.20	0.20	*	0.00
		(4.82)		(5.58)	(0.73)		(0.00)
	6	1.43	=	1.50	1.61	=	1.47
		(2.71)		(2.58)	(3.13)		(4.00)
	7	0.00	*	0.97	0.84	*	8.01
		(0.00)		(1.70)	(1.65)		(15.42)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

4.3 Average Willingness to Pay for Changes in Seatrout Catch by Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the survey, species targeting preferences were elicited by asking each angler what percentage of time (of their total time spent fishing) they spent targeting specific groups of species where species groups were determined by similarities in habitat and range. These species groups were: reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as the preferred species group for that particular angler.

4.3.1 Average Willingness to Pay for Bag Limit Changes by Targeting Preferences

A comparison between average willingness to pay for the species preference pairings of near-shore/offshore, offshore/all others, and near-shore/all others is reported in Table 4-6 for a 15 fish bag limit for seatrout. On a statewide basis, average willingness to pay for a special license stamp was $0.80 for near-shore anglers, $1.45 for offshore anglers, and $1.75 for anglers targeting all other species groups. Due to the number of categories created in Table 4-6, regional analysis of average willingness to pay is difficult due to the relatively small number of observations in each cell. Cells in which there are no observations are denoted by dashed lines (- -) and cells in which there is only one observation or all observations are the same. Considering only those cases where the sample variance is greater than zero, average willingness to pay for a license stamp ranged from $0.16 and $1.75 for near-shore anglers, $0.79 and $3.65 for offshore anglers, and $1.04 and $3.16 for anglers targeting all other species groups.

Tests for differences in average willingness to pay by species group preferences showed no difference in willingness to pay across all possible combinations of regional and species targeting preference. This finding means that, on average, willingness to pay for up to 15 seatrout per day is the same regardless of species targeting preferences.

Average willingness to pay for 20 seatrout per person per day by region and species targeting preference is reported in Table 4-7. On a state-wide basis, average willingness to pay was $1.75 for anglers targeting near-shore species, $1.72 for anglers targeting offshore species, and $0.39 for anglers targeting all other species groups. Considering only those cells in which the sample variance was greater than zero, average willingness to pay across all regions ranged between $0.32 and $5.57 for near-shore anglers, $0.91 and $2.86 for offshore anglers, and $0.28 and $1.30 for anglers targeting all other species. Statistical tests indicated that, with one exception, willingness to pay for 20 seatrout was the same regardless of species targeting preferences. The one exception was at the state level where anglers targeting near-shore species were willing to pay more than anglers targeting other species groups.

Table 4-6. Average Willingness to Pay for Seatrout Bag Limit Alternatives by Species Group Preferences, Florida and Regions (10 to 15 Seatrout)

Region		10 to 15 Seatrout								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		0.80	=	1.45	1.45	=	1.75	0.80	=	1.75
		(3.31)[a]		(6.62)	(6.62)		(3.97)	(3.31)		(3.97)
Region	1	1.17	=	0.00	0.00	*	1.76	1.17	=	1.76
		(2.72)		(0.00)	(0.00)		(3.50)	(2.72)		(3.50)
	2	1.75	*	0.00	0.00	*	1.30	1.75	=	1.30
		(7.43)		(0.00)	(0.00)		(3.08)	(7.43)		(3.08)
	3	0.00	*	0.00	0.00	*	1.92	0.00	*	1.92
		(0.00)		(0.00)	(0.00)		(3.65)	(0.00)		(3.65)
	4	- . -	*	3.65	3.65	*	1.92	- . -	*	1.92
				(14.54)	(14.54)		(4.56)			(4.56)
	5	0.00	*	0.00	0.00	*	3.16	0.00	*	3.16
		(- . -)		(0.00)	(0.00)		(8.60)	(- . -)		(8.60)
	6	0.16	=	0.79	0.79	*	1.04	0.16	=	1.04
		(0.81)		(1.87)	(1.87)		(2.28)	(0.81)		(2.28)
	7	0.60	*	0.00	0.00	*	1.13	0.60	*	1.13
		(1.32)		(0.00)	(0.00)		(1.92)	(1.32)		(1.92)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Table 4-7. Average Willingness to Pay for Seatrout Bag Limit Alternatives by Species Group Preferences, Florida and Regions (10 to 20 Seatrout)

Region		10 to 20 Seatrout								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		1.75	=	1.72	1.72	=	0.39	1.75	≠	0.39
		(6.20)[a]		(4.37)	(4.37)		(1.70)	(6.20)		(1.70)
Region	1	1.55	=	0.00	0.00	*	0.00	1.55	=	0.00
		(3.39)		(0.00)	(0.00)		(0.00)	(3.39)		(0.00)
	2	1.86	*	2.65	2.65	=	0.28	1.86	=	0.28
		(3.55)		(7.98)	(7.98)		(1.23)	(3.55)		(1.23)
	3	2.01	*	0.00	0.00	*	0.14	2.01		0.14
		(3.59)		(- . -)	(- . -)		(0.48)	(3.59)	*	(0.48)
	4	0.00	*	1.54	1.54	*	1.30	0.00	*	1.30
		(- . -)		(5.14)	(5.14)		(4.34)	(- . -)		(4.34)
	5	0.00	*	0.91	0.91	*	0.00	0.00	*	0.00
		(0.00)		(2.35)	(2.35)		(0.00)	(0.00)		(0.00)
	6	0.32	*	2.86	2.86	=	0.36	0.32	=	0.36
		(1.04)		(4.51)	(4.51)		(1.74)	(1.04)		(1.74)
	7	5.57	*	2.64	2.64	*	0.29	5.57	*	0.29
		(14.82)		(2.70)	(2.70)		(0.65)	(14.82)		(0.65)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

4.3.2 Average Willingness to Pay for Catch Rate Changes by Targeting Preferences

Average willingness to pay for a special license stamp to increase the average catch rate of seatrout from 3 fish per trip to 5 fish, by species targeting preferences is reported in Table 4-8. On a state-wide basis, average willingness to pay was $2.59 for near-shore anglers, $2.38 for offshore anglers, and $1.15 for anglers targeting all other species groups. Statistical tests indicated that at the state level anglers targeting near-shore species were willing to pay more, on average, than anglers targeting the "all other" species group category. No difference in willingness to pay was found between near-shore and offshore anglers. On a regional basis, considering only those cases with a nonzero sample variance, average willingness to pay ranged between $0.71 and $4.28 for near-shore anglers, $1.15 and $6.05 for offshore anglers, and $0.71 and $1.59 for all other anglers. Across all regions and species preference comparisons, no difference in willingness to pay was detected on the basis of species targeting preferences.

Average willingness to pay to increase the average catch rate of seatrout from 3 fish per trip to 7 fish by species targeting preferences is reported in Table 4-9. On a state-wide basis average willingness to pay was $1.96 for near-shore anglers, $2.81 for offshore anglers, and $1.31 for anglers targeting all other species groups. On a regional basis, considering only those cases having a sample variance greater than zero, average willingness to pay ranged between $0.59 and $4.30 for near-shore anglers, $1.59 and $6.26 for offshore anglers, and $0.76 and $1.94 for all other anglers. Across all regions and at the state level, no difference in willingness to pay for an increase seatrout catch rates was detected on the basis of species targeting preferences.

4.3.3 Average Willingness to Pay for Size Limit Changes by Targeting Preferences

Average willingness to pay for a special license stamp that would allow the holder to keep one trophy seatrout (i.e. greater than 24 inches) is reported in Table 4-10. At the state level, average willingness to pay was $1.51 for anglers targeting near-shore bottomfish, $1.48 for anglers preferring offshore species, and $1.21 for anglers preferring all other species groups. Statistical tests showed no difference in average willingness to pay for a trophy seatrout at the state level on the basis of species group targeting preferences.

On a regional basis, considering only those cells where the sample variance is greater than zero, average willingness to pay ranged from $0.52 to $1.79 for near-shore anglers, $0.48 to $3.04 for offshore anglers, and $0.70 to $3.97 for anglers preferring all other species groups. For those cases where a hypothesis test was possible, no difference in average willingness to pay was found between anglers with different species targeting preferences.

Table 4-8. Average Willingness to Pay for Seatrout Average Catch Alternatives by Species Group Preferences, Florida and Regions (3 to 5 Seatrout)

Region		3 to 5 Seatrout Per Trip								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		2.59 (4.19)[a]	=	2.38 (5.43)	2.38 (5.43)	=	1.15 (2.40)	2.59 (4.79)	=	1.15 (2.40)
Region	1	2.72 (3.81)	=	1.34 (2.34)	1.34 (2.34)	*	0.97 (2.13)	2.72 (3.81)	=	0.97 (2.13)
	2	0.87 (1.86)	*	6.05 (11.91)	6.05 (11.91)	=	1.29 (2.45)	0.87 (1.86)	=	1.29 (2.45)
	3	2.44 (5.42)	*	0.00 (- . -)	0.00 (- . -)	*	0.00 (0.00)	2.44 (5.42)	*	0.00 (0.00)
	4	10.00 (- . -)	*	2.24 (6.49)	2.24 (6.49)	*	0.71 (2.27)	10.00 (- . -)	*	0.71 (2.27)
	5	- . -	*	1.74 (4.92)	1.74 (4.92)	*	1.42 (3.98)	- . -	*	1.42 (3.98)
	6	4.28 (7.33)	*	1.15 (1.90)	1.15 (1.90)	=	1.59 (1.88)	4.28 (7.33)	=	1.59 (1.88)
	7	0.52 (1.32)	*	1.48 (2.43)	1.48 (2.43)	*	1.41 (3.26)	0.71 (1.43)	*	1.41 (3.26)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Table 4-9. Average Willingness to Pay for Seatrout by Average Catch Alternatives by Species Group Preferences, Florida and Regions (3 to 7 Seatrout)

Region		3 to 7 Seatrout Per Trip								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		1.96 (3.71)[a]	=	2.81 (5.82)	2.81 (5.82)	=	1.35 (2.93)	1.96 (3.71)	=	1.35 (2.93)
Region	1	2.05 (2.57)	=	0.00 (0.00)	0.00 (0.00)	*	0.76 (1.30)	2.05 (2.57)	=	0.76 (1.30)
	2	0.80 (1.16)	*	0.00 (0.00)	0.00 (0.00)	*	0.89 (3.06)	0.80 (2.70)	=	0.89 (3.06)
	3	0.59 (1.16)	*	2.69 (3.31)	2.69 (3.31)	*	1.79 (2.85)	0.59 (1.16)	*	1.79 (2.85)
	4	- . -	*	1.59 (3.97)	1.59 (3.97)	*	1.18 (4.06)	- . -	*	1.18 (4.06)
	5	0.00 (- . -)	*	2.76 (6.16)	2.76 (6.16)	*	1.54 (3.31)	0.00 (- . -)	*	1.54 (3.31)
	6	4.30 (5.78)	=	6.26 (9.02)	6.26 (9.02)	=	1.94 (3.18)	4.30 (5.78)	=	1.94 (3.18)
	7	0.96 (1.78)	*	2.25 (4.07)	2.25 (4.07)	*	1.71 (1.96)	0.96 (1.78)	*	1.71 (1.96)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay to keep 2 trophy seatrout is reported in Table 4-11. At the state level, average willingness to pay was $1.97 for anglers targeting near-shore bottomfish, $1.63 for anglers preferring offshore species, and $0.86 for anglers preferring all other species groups. Statistical tests show no difference in average willingness to pay for 2 trophy seatrout between species group targeting preferences.

On a regional basis, considering only those cells whit a nonzero sample variance, average willingness to pay ranged from $0.20 to $6.41 for near-shore anglers, $0.23 to $3.07 for offshore anglers, and $0.14 to $1.26 for anglers preferring all other species groups. For those cases where a hypothesis test was possible, no difference was found between anglers of different species targeting preferences.

Table 4-10. Average Willingness to Pay for Seatrout Size Limit Alternatives by Species Group Preferences, Florida and Regions (0 to 1 > 24")

		0 to 1 > 24"							
Region		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		1.51 (3.17)[a]	=	1.48 (5.58)	1.48 (5.58)	=	1.21 (4.18)	1.51 (3.17)	=	1.21 (4.18)
Region	1	1.58 (3.71)	=	0.48 (1.15)	0.48 (1.15)	=	1.12 (3.19)	1.58 (3.71)	=	1.12 (3.19)
	2	0.77 (1.97)	*	1.12 (2.61)	1.12 (2.61)	*	0.83 (1.99)	0.77 (1.97)	=	0.83 (1.99)
	3	1.74 (3.63)	*	0.00 (0.00)	0.00 (0.00)	*	3.97 (10.51)	1.74 (3.63)	*	3.97 (10.51)
	4	- . -	*	3.04 (12.11)	3.04 (12.11)	*	0.00 (0.00)	- . -	*	0.00 (0.00)
	5	10.00 (- . -)	*	0.00 (0.00)	0.00 (0.00)	*	2.37 (5.50)	10.00 (- . -)	*	2.37 (5.50)
	6	1.79 (3.04)	=	0.95 (1.84)	0.95 (1.84)	=	1.21 (2.49)	1.79 (3.04)	=	1.21 (2.49)
	7	0.52 (1.32)	*	0.00 (0.00)	0.00 (0.00)	*	0.70 (1.62)	0.52 (1.32)	*	0.70 (1.62)

[a]Standard deviation reported in parentheses.
[b]Sample size less than 30.

Table 4-11. Average Willingness to Pay for Seatrout Size Limit Alternatives by Species Group Preferences, Florida and Region (1 to 2 > 24")

Region		1 to 2 > 24"								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		1.97	=	1.63	1.63	=	0.86	1.97	=	0.86
		(6.33)*		(4.28)	(4.28)		(2.33)	(6.33)		(2.33)
Region	1	0.20	=	0.00	0.00	*	0.59	0.20	=	0.59
		(0.74)		(0.00)	(0.00)		(1.17)	(0.74)		(1.17)
	2	1.52	*	3.07	3.07	=	1.07	1.52	=	1.07
		(2.44)		(7.39)	(7.39)		(2.77)	(2.44)		(2.77)
	3	3.36	*	- - -	- - -	*	0.47	3.36	*	0.47
		(6.80)					(1.25)	(6.80)		(1.25)
	4	2.00	*	1.81	1.81	*	1.20	2.00	*	1.20
		(- - -)		(5.06)	(5.06)		(4.15)	(- - -)		(4.15)
	5	0.54	*	0.23	0.23	*	0.00	0.54	*	0.00
		(0.90)		(0.86)	(0.86)		(0.00)	(0.90)		(0.00)
	6	1.10	*	2.86	2.86	=	1.26	1.10	=	1.26
		(2.75)		(4.51)	(4.51)		(2.61)	(2.75)		(2.61)
	7	6.41	*	1.86	1.86	*	0.14	6.41	*	0.14
		(14.31)		(2.64)	(2.64)		(0.33)	(14.31)		(0.33)

*Standard deviation reported in parentheses.
*Sample size less than 30.

4.4 Summary

The preceding analysis of the marginal value of changes in seatrout catch regulations showed that willingness to pay for a change in the current bag limit to fifteen fish per person per day was $1.36 at the state level and ranged between $0.73 and $2.55 across all regions. Statistical tests indicated no difference in average willingness to pay between a fifteen fish bag limit change and a twenty fish bag. This finding means that, on average, the economic value of keeping more than fifteen seatrout is zero. Further analysis of the bag limit changes indicated that average willingness to pay was not affected by boat ownership or the angler's species group targeting preferences.

For changes in average daily catch rates from three to five fish per trip, average willingness to pay was $1.74 for the state and ranged from $0.89 to $2.39 across all regions. However, as was the case for the bag limit changes, no difference in average values was found between the five fish catch rate and a proposed seven fish catch rate. No differences in average values were found on the basis of boat ownership. However, anglers expressing a preference for near-shore species were found to have higher average values for catch rate changes as compared to anglers preferring to target inshore game, reef-fish, and other miscellaneous species.

Average willingness to pay to keep one or more trophy size seatrout was $1.35 for the state and ranged between $0.48 and $2.25 across all regions. No difference in willingness to pay was found between management changes that would allow keeping one and two fish respectively. Further, no difference was found in willingness to pay for a seatrout trophy stamp on the basis of boat ownership or species targeting preferences.

As was the case for redfish, there was a high percentage of respondents who gave zero values. This finding does not mean that respondents did not place any economic value on catching seatrout. Rather, it means that these anglers placed no value on the particular management changes that were presented. However, standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero willingness to pay, there were some respondents who placed a high value on the proposed changes.

5. MULLET

5.1 Average Willingness to Pay for Marginal Changes in Mullet Catch for All Anglers

Willingness to pay for a special mullet license stamp was elicited for changes in mullet bag limits. For each of two bag limit changes, respondents were given a choice between the current bag limit of 50 fish per person per day and purchasing a special license stamp that would allow a higher bag. If a stamp were not purchased, then the angler would be subject to the current 50 fish bag. Bag limit changes of 75 fish per person per day and 100 fish were presented in different versions of the survey questionnaire (Appendix C: Survey Forms A and C, respectively).

The estimated average willingness to pay for each of the bag limit changes is presented in Table 5-1. For each pair of management scenarios a statistical test was performed to

Table 5-1. Average Willingness to Pay for Mullet Bag Limit Alternatives, Florida and Regions.

		Bag Limit		
Region		50 to 75		50 to 100
Florida		0.66 (6.00)*	=	0.67 (4.50)
Region	1	0.20 (0.87)	=	0.86 (2.50)
	2	0.29 (1.47)	=	0.00 (0.00)
	3	0.22 (0.96)	=	2.15 (5.17)
	4	0.00 (0.00)	=	0.00 (0.00)
	5	0.47 (2.46)	=	1.25 (6.16)
	6	2.87 (13.84)	=	1.24 (7.74)
	7	0.34 (1.52)	=	0.39 (1.71)

*Standard deviation reported in parentheses

determine whether the computed means differed. For example, willingness to pay for a bag limit change of from 50 fish to 75 fish per day was $0.66 at the state level. For the 100 fish bag limit average willingness to pay was $0.67. A statistical test showed no difference between these two values. This finding may be interpreted as meaning that on average there is no difference in willingness to pay for either a 75 fish or a 100 fish daily bag limit for mullet. That is, the marginal value of a license stamp that would allow a bag limit greater than 75 fish is zero. A more detailed discussion of each of the management scenarios follows.

Average willingness to pay for a bag limit change of from 50 fish to 75 mullet per day was $0.66 at the state level and ranged between a low of $0.20 in region 1 to a high of $2.87 in region 6. As was the case for redfish and seatrout, average willingness to pay across management scenarios and regions exhibits substantial variability. Consequently, state-level averages will likely be more representative of saltwater recreational angler willingness to pay.

Average willingness to pay for a bag limit change from 50 to 100 mullet was $0.67 for the state. Across all regions, willingness to pay for a special license stamp ranged from a low of $0.00 in regions 4 and 2 to a high of $2.15 in region 3. Statistical tests across bag limit changes showed that, on average, willingness to pay for 75 fish is the same as willingness to pay for a 100 fish bag limit.

5.1.1 Reasons for Zero Willingness to Pay for All Anglers

Individuals expressing a zero willingness to pay for any given management change were asked about their reason for stating such a value. The percentage of individuals stating zero values and the relative distribution of reasons for zero values is reported in Table 5-2. Across all management scenarios the percentage of zero values was quite high (in excess of 90% across all management changes).

For these bag limit changes, the largest percentage of anglers (slightly more than half) stated a zero value because they did not fish for mullet. An additional one-quarter of all respondents stated they did not want to keep any more fish than they already did. The third most frequently stated reason for a zero value was the respondent did not want to pay any more to fish than he/she already does. Less than 5% of all respondents giving a zero value did so because they felt that existing regulations were not enforced or because they did not know how much the described management change would be worth to them.

Table 5-2. Reasons for Stating Zero Willingness to Pay for a Mullet Stamp (Percentages)

	Bag Limit	
Reason	50 to 75	50 to 100
Percentage of Zero Values	94.6	95.2
Do Not Fish for Mullet	52.3	54.7
Always Release all Fish	1.3	2.1
Do Not Want to Keep any More Fish	26.8	25.4
Current Regulations are not Enforced	1.7	1.3
Do Not Want to Pay More to Fish	16.2	15.3
Do Not Know the Value of the Proposed Change	1.7	1.3

5.2 Average Willingness to Pay for Marginal Changes in Mullet Catch By Boat Ownership

Unless otherwise exempt, a Florida resident must hold a saltwater fishing license if that person is fishing from a boat. Thus, boat owners may be more likely to have already purchased a saltwater fishing license and may feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns particularly with respect to income were the primary rationale for the various exemptions provided under the legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for a changes in mullet management policy were hypothesized to differ between boat owners and anglers not owning a boat.

Table 5-3 shows that at the state level, average willingness to pay for a license stamp allowing a 75 fish bag limit was $0.76 for boat owners and $0.52 for all other anglers. Among boat owners, average willingness to pay for 75 mullet ranged from a low of $0.00 in regions 3, 4, and 7 to a high of $4.23 in region 6. Similarly, willingness to pay by all others ranged between $0.00 in regions 2, 4, and 5 and $1.45 in region 6. A comparison between boat owners and all others, however, showed no difference in average willingness to pay for a 75 fish bag on the basis of boat ownership.

Willingness to pay for 100 mullet per day averaged $0.82 for boat owners and $0.44 for all other anglers on a statewide basis. On a regional basis, boat owner willingness to pay ranged between $0.00 in regions 2, 4, and 5 and $3.34 in region 3. For all other anglers, willingness to pay ranged from a high of $2.31 in region 5 to a low of $0.00 in regions 2, 3, 4, 6, and 7. Statistical tests indicated that on average boat owners are willing to pay no more for a 100 mullet bag limit than anglers that do not own a boat.

Table 5-3. Average Willingness to Pay for Mullet Bag Limit Alternatives by Boat Owners and All Other Anglers, Florida and Regions

Region		50 to 75			50 to 100		
		Boat Owner		All Others	Boat Owner		All Others
Florida		0.76 (7.54)[a]	=	0.52 (2.36)	0.82 (5.32)	=	0.44 (2.66)
Region	1	0.11 (0.55)	=	0.37 (1.28)	0.91 (2.76)	=	0.75 (1.82)
	2	0.30 (1.60)	=	0.25 (1.24)	0.00 (0.00)	=	0.00 (0.00)
	3	0.00 (0.00)	*	0.62 (1.60)	3.34 (6.32)	*	0.00 (0.00)
	4	0.00 (0.00)	*	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)
	5	0.80 (3.52)	*	0.18 (0.80)	0.00 (0.00)	*	2.31 (8.17)
	6	4.23 (19.23)	=	1.45 (4.26)	1.92 (9.59)	=	0.00 (0.00)
	7	0.00 (0.00)	=	0.85 (2.39)	0.67 (2.23)	*	0.00 (0.00)

[a]Standard deviation reported in parentheses.

5.3 Average Willingness to Pay for Marginal Changes in Mullet Catch By Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the survey, species targeting preferences were elicited by asking each angler how much time (of their total time spent fishing) that they spent targeting specific groups of species where species groups were determined by similarities in habitat and range. These species groups were: reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as the preferred species group for that particular angler.

A comparison between average willingness to pay for the species preference pairings of near-shore/offshore, offshore/all others, and near-shore/all others is reported in Table 5-4 for a 75 fish bag limit. On a statewide basis, average willingness to pay was $0.20 for near-shore anglers, $0.09 for offshore anglers, and $1.17 for anglers targeting all other species groups. Due to the number of categories created in Table 5-4, regional analysis of average willingness to pay was difficult due to the small number of observations in each cell. Cells in which there are no observations are denoted by dashed lines (- -) and cells in which there is only one observation or all observations are the same have a sample variance of zero. Considering only those cases where the sample variance is greater than zero, average willingness to pay ranged from $0.18 and $0.73 for near-shore anglers, and $0.43 and $4.86 for anglers targeting all other species groups. On average, anglers expressing a species group targeting preference for offshore gamefish were not willing to pay anything for changes in mullet bag limits.

Tests for differences in average willingness to pay by species group preferences show no difference in willingness to pay across all possible combinations of regional and species targeting preference. This finding means that, on average, willingness to pay for 75 mullet per day is the same regardless of species targeting preferences.

Average willingness to pay for 100 mullet per person per day by region and species targeting preference is reported in Table 5-5. For the state, average willingness to pay was $0.45 for anglers targeting near-shore species, $3.04 for anglers targeting offshore species, and $0.32 for anglers targeting all other species groups. Average willingness to pay among anglers preferring offshore species was found to be greater than for near-shore anglers and anglers preferring all other species groups. Considering only those cells in which the sample variance was greater than zero, average willingness to pay across all regions ranged between $0.25 and $1.61 for near-shore anglers, $4.40 and $8.76 for offshore anglers, and $0.18 and $3.01 for anglers targeting all other species. Differences were found in average willingness to pay for 100 mullet on the basis of species targeting preferences.

5.4 Summary

In the preceding analysis it was found that willingness to pay for a change in current mullet bag limits to 75 fish per person per day was $0.66 at the state and ranged between $0.00 and $2.87 across all regions. Statistical tests indicated no difference in average willingness to pay between the 75 fish bag limit change and a proposed 100 fish bag. This finding means that, on average, the economic value of keeping more than 75 mullet is zero. Further analysis of the bag limit changes indicated that average willingness to pay was not affected by boat ownership. However, at the state level, anglers expressing a preference for offshore game species were found to be willing to pay more, on average, than anglers expressing any other species targeting preference.

Table 5-4. Average Willingness to Pay by Species Group Targeted for Mullet by Bag Limit Alternatives for Florida and by Region

Region		50 to 75 Mullet								
		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		0.20 (1.07)[a]	=	0.00 (0.00)	0.00 (0.00)	=	1.17 (8.93)	0.20 (1.07)	=	1.17 (8.93)
Region	1	0.18 (0.65)	=	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)	0.18 (0.65)	=	0.00 (0.00)
	2	0.00 (0.00)	*	- . -	- . -	*	0.51 (2.06)	0.00 (0.00)	=	0.51 (2.06)
	3	0.00 (0.00)	*	- . -	- . -	*	0.43 (1.36)	0.00 (0.00)	*	0.43 (1.36)
	4	0.00 (- . -)	*	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)	0.00 (- . -)	*	0.00 (0.00)
	5	- . -	*	0.00 (0.00)	0.00 (0.00)	*	0.92 (3.37)	- . -	*	0.92 (3.37)
	6	0.33 (1.18)	*	0.00 (0.00)	0.00 (0.00)	*	4.86 (18.32)	0.33 (1.18)	=	4.86 (18.32)
	7	0.73 (2.21)	*	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)	0.73 (2.21)	*	0.00 (0.00)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Table 5-5. Average Willingness to Pay by Species Group Targeted for Mullet by Limit Alternatives for Florida and by Region (50 to 100 Mullet)

Region		50 to 100 Mullet								
		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		0.45 (2.28)[a]	≠	3.04 (12.79)	3.04 (12.79)	≠	0.32 (2.13)	0.45 (2.28)	=	0.32 (2.13)
Region	1	1.61 (3.62)	=	0.00 (0.00)	0.00 (0.00)	=	0.00 (0.00)	1.61 (3.62)	=	0.00 (0.00)
	2	0.00 (0.00)	*	0.00 (- . -)	0.00 (- . -)	=	0.00 (0.00)	0.00 (0.00)	=	0.00 (0.00)
	3	0.00 (0.00)	*	- . -	- . -	*	3.01 (6.03)	0.00 (0.00)	*	3.01 (6.03)
	4	0.00 (- . -)	*	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)	0.00 (- . -)	*	0.00 (0.00)
	5	- . -	*	4.40 (12.53)	4.40 (12.53)	*	0.18 (0.77)	- . -	*	0.18 (0.77)
	6	0.25 (1.04)	*	8.76 (20.94)	8.76 (20.94)	=	0.00 (0.00)	0.25 (1.04)	=	0.00 (0.00)
	7	0.00 (0.00)	*	0.00 (0.00)	0.00 (0.00)	*	0.92 (2.66)	0.00 (0.00)	*	0.92 (2.66)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

The statistical results indicated that recreational anglers do place an economic value on marginal changes in mullet catch regulations. However, the values for specific are not well-defined and vary considerably across respondents. The pattern of variation did not depend on factors that would be expected to influence willingness to pay such as targeting preferences and boat ownership.

Across all management scenarios more than 95 percent of all respondents gave zero willingness to pay. This finding does not mean that respondents did not place any economic value on catching mullet. It does mean that many anglers placed no value on the particular management changes that were presented. However, as was the case in previous analyses, standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero values, there were some respondents who placed a high value on the proposed changes.

6. SHEEPSHEAD

6.1 Average Willingness to Pay for Marginal Changes in Sheepshead Catch for All Anglers

Willingness to pay for a special sheepshead license stamp was elicited for changes in sheepshead bag limits. For the bag limit scenarios, respondents were informed that due to the number of people fishing for sheepshead, a daily bag limit would have to be enforced. The respondent was then told that an angler could choose to purchase a special sheepshead license stamp that would allow the holder to keep as many sheepshead as he/she cared to. If a stamp was not purchased, then the individual would be subject to the specified bag limit. The specified bag limits were a five fish and ten fish bag. The text for each of these scenarios was presented in different versions of the survey questionnaire (Appendix C: Survey Forms D and E, and B and F, respectively).

The average willingness to pay for each of the bag limit changes is presented in Table 6-1. For each pair of management scenarios a statistical test was performed to determine whether the two computed means differed. For example, willingness to pay to exceed a 5 fish daily bag limit (i.e. going from a five fish bag to no limit) was $1.01 at the state level. Average willingness to pay to go from a 10 fish bag to no limit was also $1.01. This finding may be interpreted as meaning that on average there is no difference in willingness to pay to be able to exceed either a 5 fish or a 10 fish daily bag limit for sheepshead.

On a regional basis, average willingness to pay to exceed a 5 fish bag limit ranged between a low of $0.47 in region 6 to a high of $1.72 in region 5. As was the case for redfish and seatrout, average willingness to pay across management scenarios and regions, exhibited substantial variability. Consequently, state-level averages will likely be more representative of saltwater recreational angler willingness to pay.

Average willingness to pay to exceed a 10 fish bag limit for sheepshead was $1.01 for the state. Across all regions, willingness to pay for a special license stamp ranged from a low of $0.30 in region 7 to a high of $2.53 in region 5. Statistical tests across bag limit changes showed that, on average, willingness to pay was the same to exceed either a 5 fish or a ten fish bag limit.

Table 6-1. Average Willingness to Pay for Sheepshead Bag Limit Alternatives, Florida and Regions

Region		Bag Limit 5 to No Limit		Bag Limit 10 to No Limit
Florida		1.01 (3.00)[a]	=	1.01 (3.09)
Region	1	0.68 (2.10)	=	0.57 (1.90)
	2	0.94 (3.41)	=	0.80 (3.18)
	3	0.66 (1.90)	=	0.95 (2.08)
	4	1.20 (4.28)	=	1.61 (6.47)
	5	1.72 (5.42)	=	2.53 (6.10)
	6	0.47 (1.74)	=	0.73 (1.96)
	7	1.91 (3.32)	=	0.30 (0.97)

[a] Standard deviation reported in parentheses

6.1.1 Reasons for Zero Willingness to Pay for All Anglers

Individuals expressing a zero willingness to pay for any given management change were asked about their reason for stating a zero value. The percentage of zero values and their relative distribution are reported in Table 6-2. Across all management scenarios the percentage of zero values was quite high (in excess of 85%).

For these bag limit changes, approximately the same percentage of respondents (one-third each) gave a zero willingness to pay because they did not fish for sheepshead or that the proposed bag limits would be sufficient. The third most frequently stated reason for giving a zero value was that the respondent did not want to pay any more to fish than he/she already does. Overall, Less than 8% of all respondents giving a zero value did so because they; released all fish they caught, felt that existing regulations were not enforced or because they did not know how much the described management change would be worth to them.

Table 6-2. Reasons for Stating Zero Willingness to Pay for a Sheepshead Stamp (Percentages)

Reason	Bag Limit	
	5 to No Limit	10 to No Limit
Percentage of Zero Values	85.5	87.4
Do Not Fish for Sheepshead	34.9	31.6
Always Release all Fish	2.9	5.1
Proposed Bag Limit Changes Were Enough	32.8	37.6
Current Regulations are not Enforced	1.7	1.7
Do Not Want to Pay More to Fish	25.6	23.5
Do Not Know the Value of the Proposed Change	2.1	0.4

6.2 Average Willingness to Pay for Marginal Changes in Sheepshead Catch By Boat Ownership

Unless otherwise exempt, a florida resident must hold a saltwater fishing license if fishing from a boat. Thus, boat owners are more likely to have already purchased a saltwater fishing license and may feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns particularly with respect to income were among the primary reasons for the various exemptions provided under the legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for a changes in sheepshead management policy were hypothesized to differ between boat owners and all other anglers.

Table 6-3 shows that at the state level, average willingness to pay to exceed a 5 fish bag limit was $1.01 for boat owners and $1.00 for all other anglers. Among boat owners, average willingness to pay ranged from a low of $0.14 in region 1, to a high of $1.96 in region 5. Similarly, willingness to pay by all other anglers ranged between $0.00 in region 4 and $2.14 in region 7. A comparison between boat owners and all others, however, showed that with only one exception there was no difference in average willingness to pay for a 5 fish bag. In region 1, willingness to pay by individuals that did not own a boat was greater than that of their boat owning counterparts.

Table 6-3. Average Willingness to Pay by Boat Owners and All Other Anglers for Sheepshead by Bag Limit Alternatives for Florida and by Region

Region		5 to No Limit			10 to No Limit		
		Boat Owner		All Others	Boat Owner		All Others
Florida		1.01 (2.87)[a]	=	1.00 (3.25)	0.60 (2.07)	≠	1.58 (4.10)
Region	1	0.14 (0.51)	≠	1.84 (3.55)	0.74 (2.28)	=	0.25 (0.78)
	2	0.68 (2.26)	=	1.51 (5.13)	0.00 (0.00)	≠	1.80 (4.61)
	3	0.91 (2.32)	*	0.19 (0.57)	1.02 (2.28)	*	0.85 (1.91)
	4	1.91 (5.24)	*	0.00 (0.00)	1.06 (3.92)	*	2.57 (9.69)
	5	1.96 (6.05)	*	0.92 (2.78)	1.15 (2.55)	*	3.36 (7.41)
	6	0.44 (1.70)	=	0.52 (1.84)	0.63 (1.82)	=	0.87 (2.18)
	7	1.80 (3.10)	=	2.14 (3.87)	0.00 (0.00)	*	0.64 (1.39)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Willingness to pay to exceed a 10 fish daily bag limit for sheepshead averaged $0.60 for boat owners and $1.58 for all others on a statewide basis. A test of difference between these two averages, confirmed that willingness to pay differed on the basis of boat ownership with anglers that do not own a boat being willing to pay more, on average, than boat owners. On a regional basis, boat owner willingness to pay to exceed a 10 fish bag limit ranged between $0.00 in regions 2, and 7, and $1.15 in region 5. For all others, willingness to pay ranged from a high of $3.36 in region 5 to a low of $0.25 in region 1. Statistical tests comparing average willingness to pay between boat and all other anglers indicated that with the exception of region 2, on average, boat owners are willing to pay no more to exceed a 10 sheepshead bag limit than other anglers. In region 1 average willingness to pay among anglers that did not own a boat was found to be greater than that of boat owners.

6.3 Average Willingness to Pay for Marginal Changes in Sheepshead Catch By Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the survey, species targeting preferences were by asking each angler what the percentage of time (of their total time spent fishing) that they spent targeting specific groups of species where species groups were determined by similarities in habitat and range. These species groups were; reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as the preferred species group for that particular angler.

A comparison between average willingness to pay to exceed a 5 fish bag limit for the species preference pairings of near-shore/offshore, offshore/all others, and near-shore/all others is reported in Table 6-4. On a statewide basis, average willingness to pay was $0.98 for near-shore anglers, $1.51 for offshore anglers, and $0.86 for anglers targeting all other species groups. Due to the number of categories created in Table 6-4, regional analysis of average willingness to pay was difficult due to the small number of observations in each cell. Cells in which there are no observations are denoted by dashed lines (- -) and cells in which there is only one observation or all observations are the same have a sample variance of zero. Considering only those cases where the sample variance is greater than zero, average willingness to pay ranged from $0.05 and $2.39 for near-shore anglers, $0.91 and $3.03 for offshore anglers, and $0.10 and $3.12 for anglers targeting all other species groups.

Tests for differences in average willingness to pay by species group preferences show no difference in willingness to pay across all possible combinations of regional and species targeting preference. This finding means that, on average, willingness to pay to exceed a 5 sheepshead per day bag is the same regardless of species targeting preferences.

Table 6-4. Average Willingness to Pay For Sheepshead Bag Limit Alternatives by Species Group Preferences, Florida and Regions (5 to No Limit)

		5 to No Limit								
Region		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		0.98	=	1.51	1.51	=	0.86	0.98	=	0.86
		(2.16)[a]		(4.54)	(4.54)		(3.03)	(2.16)		(3.03)
Region	1	0.71	=	3.03	3.03	*	0.10	0.71	=	0.10
		(1.59)		(5.70)	(5.70)		(0.33)	(1.59)		(0.33)
	2	1.54	*	2.34	2.34	=	0.00	1.54	=	0.00
		(2.72)		(7.46)	(7.46)		(0.00)	(2.72)		(0.00)
	3	0.13	*	- . -	- . -	*	0.84	0.13	*	0.84
		(0.34)		0.00	0.00		(2.40)	(0.34)		(2.40)
	4	0.00	*	2.62	2.62	*	0.95	0.00	*	0.95
		(- . -)		(5.83)	(5.83)		(4.09)	(- . -)		(4.09)
	5	1.58	*	0.23	0.23	*	3.12	1.58	*	3.12
		(3.59)		(0.86)	(0.86)		(7.84)	(3.59)		(7.84)
	6	0.05	*	1.43	1.43	=	0.31	0.05	=	0.31
		(0.22)		(3.50)	(3.50)		(0.95)	(0.22)		(0.95)
	7	2.39	*	0.91	0.91	*	2.82	2.39	*	2.82
		(3.51)		(1.79)	(1.79)		(4.84)	(3.51)		(4.84)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay to exceed a 10 sheepshead per person per day bag limit by region and species targeting preference is reported in Table 6-5. On a state-wide basis, average willingness to pay was $0.39 for anglers targeting near-shore species, $0.12 for anglers targeting offshore species, and $1.88 for anglers targeting all other species groups. At the state level, average willingness to pay among anglers in the "all other" species group targeting category, was found to be greater than that of anglers preferring to target near-shore bottomfish and anglers preferring offshore game species. Considering only those cells in which the sample variance was greater than zero, average willingness to pay across all regions ranged between $0.18 and $0.86 for near-shore anglers, and $0.50 and $4.40 for anglers targeting all other species. On a regional basis no difference was found in average willingness to pay to exceed a 10 fish daily bag limit.

6.4 Summary

In the preceding analysis, it was found that willingness to pay for a license stamp that would allow the holder to exceed a proposed bag limit of five sheepshead per person per day was $1.01 for the state and ranged between $0.47 and $1.91 across all regions. In the proposed sheepshead management changes, an individual might be expected to be willing to pay more the more restrictive the bag limit change. However, statistical tests indicated no difference in

average willingness to pay to exceed a five fish or a ten fish bag limit. Further analysis of the bag limit changes indicated that at the state level, average willingness to pay to exceed a ten fish bag limit was greater among individuals that did not own a boat as compared to their boat owning counterparts. Similarly, on average, anglers preferring inshore game, reef-fish, and miscellaneous other species were found to be willing to pay more than anglers preferring any other species groups. No difference in average values was found on the basis of boat ownership or species targeting preferences to exceed a five fish bag.

Table 6-5. Average Willingness to Pay for Sheepshead Bag Limit Alternatives by Species Group Preferences, Florida and Region (10 to No Limit)

	10 to No Limit								
Region	Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida	0.39 (1.91)[a]	=	0.12 (0.82)	0.12 (0.82)	≠	1.88 (4.41)	0.39 (1.91)	≠	1.88 (4.41)
Region 1	0.86 (2.79)	=	0.00 (0.00)	0.00 (0.00)	=	0.50 (1.06)	0.86 (2.79)	=	0.50 (1.06)
2	0.00 (0.00)	*	0.00 (0.00)	0.00 (0.00)	*	2.00 (4.81)	0.00 (0.00)	=	2.00 (4.81)
3	0.00 (0.00)	*	0.00 (0.00)	0.00 (0.00)	*	1.20 (2.48)	0.00 (0.00)	*	1.20 (2.48)
4	- . -	*	0.00 (0.00)	0.00 (0.00)	*	2.66 (8.48)	- . -	*	2.66 (8.48)
5	0.00 (- . -)	*	0.00 (0.00)	0.00 (0.00)	*	4.40 (7.81)	0.00 (- . -)	*	4.40 (7.81)
6	0.54 (1.94)	=	0.79 (1.87)	0.79 (1.87)	*	0.72 (2.06)	0.54 (1.94)	=	0.72 (2.06)
7	0.18 (0.63)	*	0.00 (0.00)	0.00 (0.00)	*	0.63 (1.53)	0.18 (0.63)	*	0.63 (1.53)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Across all management scenarios more than 85 percent of all respondents gave zero values. This finding does not mean that respondents did not place any value on having access to sheepshead. It does mean that many anglers placed no value on the particular management changes that were presented. However, as was the case in previous analyses, estimated standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero values, there were some respondents that placed a very high value on the proposed change.

7. POMPANO

7.1 Average Willingness to Pay for Marginal Changes in Pompano Catch for All Anglers

Willingness to pay for a special pompano license stamp was elicited for changes in pompano bag limits. For the bag limit scenarios, respondents were informed that due to the number of people fishing for pompano a daily bag limit would have to be enforced. The respondents were then told that an angler could choose to purchase a special pompano license stamp that would allow the holder to keep as many pompano as he/she cared to. If a stamp were not purchased then the individual would be subject to the specified bag limit. The specified bag limits were a 2 fish and 4 fish bag. The each of these scenarios were presented in different versions of the survey questionnaire (Appendix C: Survey Forms C and E, and A and F, respectively).

The average willingness to pay for each of the bag limit changes is presented in Table 7-1. For each pair of management scenarios a statistical test was performed to determine whether the two computed means differed. For example, willingness to pay to exceed a 2 fish daily bag limit (i.e. going from a proposed 2 fish bag limit to no limit) was $1.44 at the state level. For the 4 fish bag limit, average willingness to pay to exceed the bag was $0.65. However, statistical tests showed no difference between these two values. This finding may be interpreted as meaning that, on average, there is no difference in willingness to pay to be able to exceed either a 2 fish or a 4 fish daily bag limit for pompano.

On a regional basis, average willingness to pay to exceed a 2 fish bag limit for pompano ranged between a low of $0.67 in region 4 to a high of $5.41 in region 3. Average willingness to pay across management scenarios and regions, exhibited substantial variability. Consequently, state-level averages will likely be more representative of saltwater recreational angler willingness to pay.

Average willingness to pay to exceed a 4 fish bag limit was $0.65 for the state. Across all regions, willingness to pay ranged from a low of $0.00 in region 4 to a high of $1.54 in region 5. However, statistical tests across bag limit changes showed that, on average, respondents placed no more value on a management change that would allow anglers to exceed a 2 fish bag as compared to willingness to pay to exceed a 4 fish bag limit.

Table 7-1. Average Willingness to Pay for Pompano Bag Limit Alternatives, Florida and Regions

Region		Bag Limit		
		2 to No Limit		4 to No Limit
Florida		1.44 (5.65)[a]	=	0.65 (2.26)
Region	1	1.16 (3.38)	=	0.32 (1.09)
	2	0.90 (4.81)	=	0.29 (1.32)
	3	5.41 (14.87)	=	0.54 (1.95)
	4	0.67 (3.32)	=	0.00 (0.00)
	5	3.31 (12.50)	=	1.54 (4.87)
	6	1.20 (2.71)	=	1.13 (2.63)
	7	0.94 (2.69)	=	1.17 (2.72)

[a] Standard deviation reported in parentheses

7.1.1 Reasons for Zero Willingness to Pay for All Anglers

Individuals expressing a zero willingness to pay for any given management change were asked their reason for stating a zero value. The percentage of zero values and the relative distribution of reasons for zero values for pompano is reported in Table 7-2. Across all management scenarios the percentage of zero values was quite high (in excess of 85% across all management changes).

For these bag limit changes, approximately one-half of all individuals gave a zero value did so because they did not fish for pompano. The remaining percentage of respondents giving a zero value were approximately equally divided (20%) between those that felt the proposed bag limits would be enough and because they do not want to pay any more to fish than they already do. Overall, Less than 8% of all respondents giving a zero value did so because they released all fish they caught, felt that existing regulations were not enforced or because they did not know how much the described management change would be worth to them.

Table 7-2. Reasons for Stating Zero Willingness to Pay for a Pompano Stamp (Percentages)

	Bag Limit	
Reason	2 to No Limit	4 to No Limit
Percentage of Zero Values	85.3	90.3
Do Not Fish for Pompano	51.9	46.7
Always Release all Fish	3.3	1.3
Proposed Bag Limit Changes Were Enough	19.3	26.7
Current Regulations are not Enforced	0.9	2.7
Do Not Want to Pay More to Fish	20.3	20.4
Do Not Know the Value of the Proposed Change	4.2	2.2

7.2 Average Willingness to Pay for Marginal Changes in Pompano Catch By Boat Ownership

Unless otherwise exempt, a Florida resident must hold a saltwater fishing license if fishing from a boat. Thus, boat owners may be more likely to have already purchased a saltwater fishing license and may feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns, particularly with respect to income, were among the primary reasons for the various exemptions provided under the legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for a changes in pompano management policy were hypothesized to differ among boat owners and all other anglers.

Table 7-3 shows that at the state level, average willingness to exceed a 2 fish bag limit was $1.22 for boat owners and $1.78 for boat owners. Among boat owners, average willingness to pay ranged from a low of $0.00 in region 5, to a high of $8.80 in region 3. Similarly, willingness to pay by all other anglers ranged between $0.00 in region 3 and $6.11 in region 5. A comparison between boat owners and all others, however, showed no difference in average willingness to pay to exceed a 2 fish bag on the basis of boat ownership.

Table 7-3. Average Willingness to Pay for Pompano Bag Limit Alternatives by Boat Owners and All Other Anglers, Florida and Regions

Region		2 to No Limit			4 to No Limit		
		Boat Owners		All Others	Boat Owners		All Others
Florida		1.22	=	1.78	0.55	=	0.81
		(5.15)[a]		(6.44)	(1.95)		(2.65)
Region	1	1.60	=	0.10	0.24	=	0.45
		(3.97)		(0.34)	(0.73)		(1.57)
	2	0.45	=	1.42	0.32	=	0.24
		(1.55)		(6.85)	(1.40)		(1.21)
	3	8.80	*	0.00	0.16	*	1.24
		(18.76)		(0.00)	(0.52)		(3.19)
	4	0.74	*	0.35	0.00	*	0.00
		(3.66)		(0.78)	(0.00)		(0.00)
	5	0.00	*	6.11	1.24	*	1.80
		(0.00)		(16.20)	(3.98)		(5.73)
	6	1.44	=	0.77	1.23	=	1.01
		(2.89)		(2.35)	(2.86)		(2.43)
	7	0.34	*	1.80	1.17	*	1.16
		(1.12)		(3.95)	(2.89)		(2.58)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Willingness to pay to exceed a 4 fish daily bag limit for pompano averaged $0.55 for boat owners and $0.81 for all other anglers on a statewide basis. A test of differences between these two averages, showed no difference in willingness to pay on the basis of boat ownership. On a regional basis, boat owner willingness to pay to exceed a 4 fish bag limit ranged between $0.00 in region 4, and $1.24 in region 5. For all others, willingness to pay ranged from a high of $1.24 in region 3 to a low of $0.00 in region 4. Statistical tests comparing average values to exceed a 4 fish bag indicated no difference in willingness to pay on the basis of boat ownership.

7.3 Average Willingness to Pay for Marginal Changes in Pompano Catch By Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the survey, species targeting preferences were elicited by asking each angler what

percentage of time (of their total time spent fishing) spent targeting specific groups of species where species groups were determined by similarities in habitat and range. These species groups were: reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as the preferred species group for that particular angler.

A comparison between average willingness to pay to exceed a 2 fish bag limit between species targeting preference is reported in Table 7-4. On a statewide basis, average willingness to pay was $1.08 for near-shore anglers, $3.06 for offshore anglers, and $1.24 for anglers targeting all other species groups. Considering only those cases where the sample variance was greater than zero, average willingness to pay for a license stamp ranged from $0.09 and $1.89 for near-shore anglers, $1.71 and $11.70 for offshore anglers, and $0.09 and $7.82 for anglers targeting all other species groups.

Tests for differences in average willingness to pay showed no differences across all possible combinations of regional and species targeting preference. This finding means that, on average, willingness to pay to exceed a 2 pompano per day bag is the same regardless of species targeting preferences.

Average willingness to pay to exceed a 4 pompano per person per day bag limit by region and species targeting preference is reported in Table 7-5. On a state-wide basis, average willingness to pay was $0.24 for anglers targeting near-shore species, $0.85 for anglers targeting offshore species, and $0.94 for anglers targeting all other species groups. At the state level, average willingness to pay was greater among near-shore anglers and anglers in the all other species group targeting category. However, no difference in average willingness to pay was found between near-shore and offshore anglers or between offshore and anglers targeting all other species. Considering only those cells in which the sample variance was greater than zero, average willingness to pay across all regions ranged between $0.17 and $0.40 for near-shore anglers, and $0.86 and $2.46 for anglers targeting all other species. On a regional basis no difference was found in average willingness to pay to exceed a 4 fish daily bag limit.

Table 7-4. Average Willingness to Pay for Pompano Bag Limit Alternatives by Species Group Preferences, Florida and Regions (2 to No Limit)

Region		2 to No Limit								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		1.08	=	3.06	3.06	=	1.24	1.08	=	1.24
		(4.25)[a]		(9.76)	(9.76)		(5.69)	(4.25)		(5.69)
Region	1	0.96	=	2.02	2.02	*	0.09	0.96	=	0.09
		(2.80)		(3.30)	(3.30)		(0.32)	(2.80)		(0.32)
	2	1.89	*	0.00	0.00	*	0.27	1.89	=	0.27
		(8.62)		(- . -)	(- . -)		(1.16)	(8.62)		(1.16)
	3	0.00	*	- . -	- . -	*	7.82	0.00	*	7.82
		(0.00)					(17.75)	(0.00)		(17.75)
	4	0.00	*	0.00	0.00	*	1.28	0.00	*	1.28
		(- . -)		(0.00)	(0.00)		(4.52)	(- . -)		(4.52)
	5	- . -	*	11.70	11.70	*	0.45	- . -	*	0.45
				(23.64)	(23.64)		(1.33)			(1.33)
	6	0.98	*	1.71	1.71	*	1.33	0.98	=	1.33
		(2.52)		(3.45)	(3.45)		(2.81)	(2.52)		(2.81)
	7	0.09	*	0.00	0.00	*	2.12	0.09	*	2.12
		(0.25)		(0.00)	(0.00)		(4.04)	(0.25)		(4.04)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Table 7-5. Average Willingness to Pay for Pompano Bag Limit Alternatives by Species Group Preferences, Florida and Regions (4 to No Limit)

Region		4 to No Limit								
		Near-Shore		Offshore	Offshore		All Other	Near-Shore		All Other
Florida		0.24	=	0.85	0.85	=	0.94	0.24	=	0.94
		(0.96)[a]		(2.76)	(2.76)		(2.90)	(0.96)		(2.90)
Region	1	0.17	=	0.00	0.00	*	0.86	0.17	=	0.86
		(0.68)		(0.00)	(0.00)		(1.85)	(0.68)		(1.85)
	2	0.00	*	- . -	- . -	*	0.59	0.00	=	0.59
		(0.00)					(1.84)	(0.00)		(1.84)
	3	0.37	*	- . -	- . -	*	0.86	0.37	*	0.86
		(0.78)					(2.73)	(0.78)		(2.73)
	4	0.00	*	0.00	0.00	*	0.00	0.00	*	0.00
		(- . -)		(0.00)	(0.00)		(0.00)	(- . -)		(0.00)
	5	- . -	*	1.51	1.51	*	1.73	- . -	*	1.73
				(4.45)	(4.45)		(5.56)			(5.56)
	6	0.78	*	0.00	0.00	*	1.55	0.78	=	1.55
		(1.74)		(0.00)	(0.00)		(3.20)	(1.74)		(3.20)
	7	0.40	*	0.00	0.00	*	2.46	0.40	*	2.46
		(1.23)		(0.00)	(0.00)		(4.04)	(1.23)		(4.04)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

7.4 Summary

In the preceding analysis of the marginal value of changes in pompano management, it was found that willingness to pay to exceed a proposed bag limit of two pompano per person per day was $1.44 for the state and ranged between $0.67 and $5.41 across all regions. In the proposed pompano management changes, an individual might be expected to be willing to pay more the more restrictive the bag limit change. However, statistical tests indicated no difference in average willingness to pay to exceed a two fish or a four fish bag limit. Further analysis of the bag limit changes indicated no difference in average values across all management scenarios on the basis of boat ownership or species targeting preferences.

Across all management scenarios more than 85 percent of all respondents gave zero values. This finding does not mean that respondents did not place any economic value on catching pompano. It does mean that many anglers placed no value on the particular management changes that were presented. However, as was the case in previous analyses, estimated standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero willingness to pay, there were some respondents that placed a high value on the proposed changes.

8. KING MACKEREL

8.1 Average Willingness to Pay for Marginal Changes in King Mackerel Catch for All Anglers

Willingness to pay for a special king mackerel license stamp was elicited for changes in two different management alternatives: bag limit changes, and catch rate changes. For the bag limit changes, respondents were given a choice between the current bag limit of 2 fish per person per day and purchasing a special license stamp that would allow a higher bag. If a stamp were not purchased then the individual would be subject to the current 2 fish bag. Bag limit changes of 5 fish per person per day and 10 fish were presented in different versions of the survey questionnaire (Appendix C: Survey Forms B and D respectively).

For the catch rate changes, survey respondents were informed that through a management program the current average daily catch for king mackerel could be increased. However, such programs would not be possible unless recreational fishermen were to purchase a license stamp. The respondent was informed that purchase of a stamp would be voluntary, however, all proceeds from its sale would be dedicated to increasing king mackerel stocks. Current catch rates were computed using NMFS intercept survey data. Two scenarios were then constructed, one in which the catch rate would be improved from one fish caught for every three trips (1:3) to one fish caught per every two trips (1:2), and a second in which catch rates would be improved to one fish caught every trip (1:1). The text for these two scenarios can be found in Appendix C: Survey Forms G and H respectively.

The computed average willingness to pay for each of the different management changes is presented in Table 8-1. For each pair of management scenarios, a statistical test was performed to determine whether the two averages were different from one another. For example, willingness to pay for a bag limit change of from 2 fish to 5 fish per day was $2.05 at the state level. For the 10 fish bag limit, average willingness to pay was $2.33. A statistical test showed that there was no difference between these two values. This finding may be interpreted as meaning that on average there is no difference in willingness to pay for either a 5 fish or a 10 fish daily bag limit for king mackerel. That is, the marginal value of a bag limit greater than 5 fish is zero. A more detailed discussion of each of the management scenarios follows.

Average willingness to pay for a bag limit change of from 2 to 5 king mackerel per day was $2.05 at the state level and ranged between a low of $0.78 in region 6 to a high of $4.43 in region 4. As was the case for previous species, average willingness to pay across management scenarios and regions exhibited substantial variability. Consequently, state-level averages will likely be more representative of saltwater recreational angler willingness to pay.

Table 8-1. Average Willingness to Pay for King Mackerel Management Alternatives, Florida and Regions

Region	Bag Limit		Average Catch	
	2 to 5	2 to 10	1:3 to 1:2	1:3 to 1:1
Florida	2.05	2.33	1.99	1.85
	(6.08)*	(7.36)	(5.10)	(5.08)
Region 1	1.96	1.65	1.51	1.58
	(3.40)	(5.34)	(3.05)	(3.47)
2	2.18	0.94	1.90	1.36
	(8.05)	(3.25)	(7.50)	(4.67)
3	2.06	2.36	1.18	1.30
	(4.41)	(5.04)	(4.42)	(2.68)
4	4.43	2.10	2.73	1.51
	(14.94)	(5.06)	(5.82)	(4.48)
5	1.79	6.40	2.91	1.57
	(4.33)	(19.65)	(6.33)	(4.17)
6	0.78	1.35	1.27	2.86
	(2.62)	(3.53)	(2.25)	(7.38)
7	1.03	4.21	3.17	2.83
	(2.40)	(9.42)	(6.64)	(5.49)

* Standard deviation reported in parentheses

Average willingness to pay for a bag limit change from 2 to 10 king mackerel was $2.33 for the state. Across all regions, willingness to pay ranged from a low of $0.94 in region 2 to a high of $6.40 in region 5. Statistical tests across bag limit changes showed that, on average, respondents placed no more value on a management change that would allow a 5 fish bag than for a 10 fish bag limit.

Average willingness to pay to increase the average daily catch rate for king mackerel from one fish in three trips to one fish in two trips was $1.99 at the state level and ranged between $1.18 in region 3 to $3.17 in region 7. Average willingness to pay for an increased catch rate from one fish in three trips to one fish every trip was $1.85 at the state level and ranged between $1.30 in region 3 and $2.86 in region 6. Across all regions, anglers were willing to pay no more for an increase in the king mackerel catch rate from 1 fish in two trips as compared to willingness to pay for a catch rate of one fish per trip.

8.1.1 Reasons for Zero Willingness to Pay for All Anglers

Individuals expressing a zero willingness to pay for any given management change were queried as to the reason for stating such a value. The percentage of zero values and the relative distribution of reasons for zero values for king mackerel are reported in Table 8-2. Across all

management scenarios, the percentage of zero values was quite high (in excess of 75% across all management changes). For the average catch scenarios, the percentage of zero values was only slightly lower than that found for the bag limit changes.

Table 8-2. Reasons for Stating Zero Willingness to Pay for a King Mackerel Stamp (Percentages)

	Bag Limit		Average Catch	
Reason	2 to 5	2 to 10	1:3 to 1:2	1:3 to 1:1
Percentage of Zero Values	79.1	79.4	74.5	76.7
Do Not Fish for King Mackerel	42.7	45.8	40.5	37.7
Always Release all Fish	4.7	1.4	NA[a]	NA
Do Not Want to Keep any More Fish	22.1	26.4	NA	NA
Already Catch Enough Fish	NA	NA	8.6	10.4
Current Regulations are not Enforced	0.9	2.8	NA	NA
Do Not Want to Pay More to Fish	26.3	22.2	40.5	39.9
Do Not Know the Value of the Proposed Change	3.3	1.4	10.3	12.0

a NA = Not Applicable

For the bag limit changes, the largest percentage of anglers stating a zero bid for a king mackerel stamp (approximately 40%) indicated that they did not fish for king mackerel. An additional 40% indicated they did not want to keep any more fish than they already did (22 to 26%) or they did not want to pay any more to fish than they already did. Less than 8% of respondents provided a zero value because they felt bag limits were not being enforced, they always release all the fish they catch, or they did not know what the management change would be worth to them. For the average catch alternatives the percentage of individuals stating a zero value for a change in king mackerel catch rates was approximately equally divided (40% each) among those who did not want to pay any more to fish than they already did, or because they did not fish for king mackerel. The percentage of individuals that did not know what the management change would be worth to them was higher for the average catch scenarios (10.3% to 12.0%) than the bag limit changes (3.3% to 1.4%).

8.2 Average Willingness to Pay for Marginal Changes in King Mackerel Catch By Boat Ownership

Unless otherwise exempt, a Florida resident must hold a saltwater fishing license if fishing from a boat. Thus, boat owners may be more likely to have already purchased a saltwater fishing license and feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns particularly with respect to income were among the primary reasons for the various exemptions provided under the legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for a changes in king mackerel management policy were hypothesized to differ among boat owners and all other anglers.

8.2.1 Average Willingness to Pay for bag Limit Changes by Boat Ownership

Table 8-3 shows that at the state level, average willingness to pay for a 5 fish bag limit was $2.34 for boat owners and $1.65 for all other anglers. Among boat owners, average willingness to pay ranged from a low of $0.21 in region 6 to a high of $5.60 in region 4. Similarly, willingness to pay by all others ranged between $0.22 in region 7 and $3.30 in region 3. A comparison between boat owners and all other anglers, however, showed that except for one instance, there was no difference in willingness to pay on the basis of boat ownership. In region 6, anglers that did not own a boat were found to be willing to pay more for a 5 fish bag limit than were boat owners. No statistical test for regions 3, 4, 5, and 7 were conducted due to insufficient sample sizes.

Willingness to pay for bag limit of 10 king mackerel per day averaged $2.46 for boat owners and $2.07 for all others on a statewide basis. On a regional basis, boat owner willingness to pay for a 10 fish bag limit ranged between $0.92 in region 2 and $7.67 in region 5. For all other anglers, willingness to pay ranged from a high of $6.97 in region 7 to a low of $0.99 in region 2. Statistical tests comparing average willingness to pay between boat owners and all others indicated that, on average, boat owners are willing to pay no more for a license stamp allowing a 10 king mackerel bag limit than all other anglers, and vice versa.

8.2.2 Average Willingness to Pay for Average Catch Changes by Boat Ownership

Average willingness to pay for changes in average catch rates for king mackerel by boat ownership are reported in Table 8-4. State-wide, average willingness to pay for a king mackerel license stamp to increase catch rates to 1 fish in 2 trips was $1.85 for boat owners and $2.22 for all others. On a regional basis, average willingness to pay among boat owners was highest in region 7 ($4.67) and lowest in region 3 ($0.00). For anglers that did not own a boat, willingness to pay ranged between $1.00 in region 4 and $4.00 in region 3. For those cases

were a statistical test was possible, no difference was found in average willingness to pay for a license stamp on the basis of boat ownership.

Table 8-3. Average Willingness to Pay for King Mackerel Bag Limit Alternatives by Boat Owners and All Other Anglers, Florida and Regions

Region		2 to 5			2 to 10		
		Boat Owners		All Others	Boat Owners		All Others
Florida		2.34	=	1.65	2.46	=	2.07
		(7.21)[a]		(3.91)	(7.63)		(6.81)
Region	1	2.23	=	1.42	1.30	=	2.50
		(3.52)		(3.18)	(5.73)		(4.38)
	2	2.91	=	1.27	0.92	=	0.99
		(10.38)		(3.15)	(2.10)		(4.96)
	3	0.90	*	3.30	2.29	*	2.50
		(2.70)		(5.68)	(4.56)		(6.07)
	4	5.60	*	2.39	2.37	*	1.70
		(18.24)		(6.18)	(5.30)		(5.00)
	5	1.99	*	1.68	7.67	*	1.26
		(3.10)		(5.01)	(21.73)		(3.24)
	6	0.21	≠	1.68	1.29	=	1.46
		(0.79)		(3.99)	(3.25)		(4.03)
	7	1.69	*	0.22	2.86		6.97
		(3.09)		(0.71)	(4.25)		(15.38)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

For a management change that would increase king mackerel catch rates from 1 fish per trip, average willingness to pay among boat owners was $1.29 for the state and ranged from a low of $0.00 in region 4 to a high of $3.17 in region 7. Average willingness to pay among all other anglers at the state level was $2.53 and ranged across all regions from $1.12 in region 7 to $4.95 in region 6. At the state level, average willingness to pay for a change in king mackerel catch rates was found to be greater among individuals not owning a boat than boat owners. Across all regions, statistical tests showed that in only region 6 was there a difference in average willingness to pay on the basis of boat ownership. In region 6 individuals that did not own a boat were willing to pay more, on average, than boat owners.

8.3 Average Willingness to Pay for Marginal Changes in King Mackerel Catch By Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the survey, species targeting preferences were elicited by asking each angler what percentage of time (of their total time spent fishing) they spent targeting specific groups of species where species groups were determined by similarities in habitat and range. These species groups were: reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine the targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as being the preferred species group for that particular angler.

Table 8-4. Average Willingness to Pay for King Mackerel Average Catch Alternatives by Boat Owners and All Other Anglers, Florida and Regions

		1:3 to 1:2			1:3 to 1:1		
Region		Boat Owners		All Others	Boat Owners		All Others
Florida		1.85	=	2.22	1.29	≠	2.53
		(4.11)[a]		(6.36)	(3.81)		(6.42)
Region	1	1.29	=	1.96	1.42	=	1.88
		(4.19)		(4.08)	(2.59)		(4.74)
	2	1.15	=	3.33	1.15	=	1.57
		(2.72)		(10.85)	(4.49)		(4.92)
	3	0.00	*	4.00	0.76	*	2.27
		(0.00)		(8.94)	(1.56)		(3.97)
	4	3.07	*	1.00	0.00	*	3.07
		(4.62)		(1.41)	(0.00)		(5.72)
	5	3.40	*	2.00	1.03	*	1.79
		(5.44)		(4.00)	(2.18)		(4.83)
	6	1.18	=	1.38	1.50	≠	4.95
		(2.48)		(2.47)	(4.33)		(10.24)
	7	4.67	*	2.08	3.17	*	1.12
		(8.34)		(7.22)	(5.94)		(2.09)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

8.3.1 Average Willingness to Pay for Bag Limit Changes by Targeting Preferences

A comparison between average willingness to pay for the species preference pairings of near-shore/offshore, offshore/all others, and near-shore/all others is reported in Table 8-5 for the 5 fish bag limit scenario. On a statewide basis, average willingness to pay was $0.90 for near-shore anglers, $4.55 for offshore anglers, and $2.35 for anglers targeting all other species groups. Due to the number of categories created in Table 8-5, regional analysis of average willingness to pay is difficult due to the relatively small number of observations in each cell. Cells in which there are no observations are denoted by dashed lines (- -) and cells in which there is only one observation or all observations are the same have a sample variance of zero. Considering only those cases where the sample variance is greater than zero, average willingness to pay ranged from $0.15 and $5.00 for near-shore anglers, $0.79 and $8.05 for offshore anglers, and $1.76 and $3.18 for anglers targeting all other species groups.

Table 8-5. Average Willingness to Pay for King Mackerel Bag Limit Alternatives by Species Group Preferences, Florida and Regions (2 to 5 King Mackerel)

		2 to 5 King Mackerel								
Region		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		0.90 (2.68)[a]	≠	4.54 (11.33)	4.54 (11.33)	=	2.35 (6.54)	0.90 (2.68)	=	2.35 (6.54)
Region	1	1.66 (3.66)	=	3.16 (3.62)	3.16 (3.62)	=	2.11 (3.65)	1.66 (3.66)	=	2.11 (3.65)
	2	0.33 (1.45)	*	4.78 (5.89)	4.78 (5.89)	=	3.18 (12.05)	0.33 (1.45)	=	3.18 (12.05)
	3	1.74 (3.63)	*	0.00 (0.00)	0.00 (0.00)	*	2.95 (6.06)	1.74 (3.63)	*	2.95 (6.06)
	4	- . -	*	8.05 (23.72)	8.05 (23.72)	*	2.53 (6.05)	- . -	*	2.53 (6.05)
	5	5.00 (- . -)	*	1.61 (3.58)	1.61 (3.58)	*	2.28 (5.39)	5.00 (- . -)	*	2.28 (5.39)
	6	0.15 (0.80)	=	0.79 (1.87)	0.79 (1.87)	*	1.76 (4.38)	0.15 (0.80)	=	1.76 (4.38)
	7	1.50 (3.02)	*	2.62 (2.97)	2.62 (2.97)	*	0.00 (0.00)	1.50 (3.02)	*	0.00 (0.00)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Tests for differences in average willingness to pay by species group preferences showed that only at the state level among anglers preferring near-shore bottomfish and anglers preferring offshore species is there a difference in willingness to pay on the basis of species targeting

preferences. At the state level, average willingness to pay among offshore anglers was greater than that of anglers preferring near-shore species.

Average willingness to pay to keep up to 10 king mackerel per person per day by region and species targeting preference is reported in Table 8-6. On a statewide basis, average willingness to pay was $1.60 for anglers targeting near-shore species, $3.24 for anglers targeting offshore species, and $2.94 for anglers targeting all other species groups. Considering only those cells in which the sample variance was greater than zero, average willingness to pay across all regions ranged between $0.16 and $6.28 for near-shore anglers, $1.49 and $6.48 for offshore anglers, and $0.14 and $12.22 for anglers targeting all other species. Statistical tests indicated that willingness to pay to keep 10 king mackerel is the same regardless of species targeting preferences at the state level and across all regions.

Table 8-6. Average Willingness to Pay for King Mackerel Bag Limit Alternatives by Species Group Preferences, Florida and Regions (2 to 10 King Mackerel)

	2 to 10 King Mackerel								
Region	Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida	1.60	=	3.24	3.24	=	2.94	1.60	=	2.94
	(6.28)[a]		(5.38)	(5.38)		(9.46)	(6.28)		(9.46)
Region 1	0.16	=	4.69	4.69	*	3.12	0.16	=	3.12
	(0.67)		(5.90)	(5.90)		(8.34)	(0.67)		(8.34)
2	0.00	*	4.30	4.30	*	0.86	0.00	*	0.86
	(0.00)		(7.64)	(7.64)		(2.03)	(0.00)		(2.03)
3	5.15	*	- - -	- - -	*	0.49	5.15	*	0.49
	(8.19)					(1.25)	(8.19)		(1.25)
4	0.00	*	2.94	2.94	*	2.26	0.00	*	2.26
	(- - -)		(5.40)	(5.40)		(5.56)	(- - -)		(5.56)
5	0.00	*	1.49	1.49	*	12.22	0.00	*	12.22
	(0.00)		(2.88)	(2.88)		(27.93)	(0.00)		(27.93)
6	0.57	*	3.47	3.47	=	1.68	0.57	=	1.68
	(2.05)		(4.42)	(4.42)		(4.31)	(2.05)		(4.31)
7	6.28	*	6.48	6.48	*	0.14	6.28	*	0.14
	(13.15)		(6.39)	(6.39)		(0.33)	(13.15)		(0.33)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

8.3.2 Average Willingness to Pay for Catch Rate Changes by Targeting Preferences

Average willingness to pay to increase the average catch rate of king mackerel to 1 fish every 2 trips, by species targeting preferences is reported in Table 8-7. On a state-wide basis, average willingness to pay was $1.63 for near-shore anglers, $4.21 for offshore anglers, and

$1.78 for anglers targeting all other species groups. Statistical tests indicated that anglers targeting offshore species were willing to pay more, on average, than both, anglers targeting the "all other" species group category, and those individuals preferring near-shore species. On a regional basis, considering only those cases with a nonzero sample variance, average willingness to pay ranged between $0.84 and $4.07 for near-shore anglers, $1.48 and $11.75 for offshore anglers, and $1.13 and $3.53 for all other anglers. Across all regions and species preference comparisons, no difference in willingness to pay was detected on the basis of species targeting preferences.

Table 8-7. Average Willingness to Pay for King Mackerel Catch Rate Alternatives by Species Group Preferences, Florida and Region (1:3 to 1:2 King Mackerel)

	1:3 to 1:2 King Mackerel								
Region	Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida	1.63	≠	4.21	4.21	≠	1.78	1.63	=	1.78
	(4.03)[a]		(9.64)	(9.64)		(3.83)	(4.03)		(3.83)
Region 1	1.65	=	2.98	2.98	*	1.13	1.65	=	1.13
	(3.66)		(3.53)	(3.53)		(2.21)	(3.66)		(2.21)
2	0.84	*	11.75	11.75	=	1.30	0.84	=	1.30
	(2.02)		(23.67)	(23.67)		(3.38)	(2.02)		(3.38)
3	3.25	*	0.00	0.00	*	0.00	3.25	*	0.00
	(7.23)		(- . -)	(- . -)		(0.00)	(7.23)		(0.00)
4	0.00	*	4.82	4.82	*	2.20	0.00	*	2.20
	(- . -)		(7.79)	(7.79)		(5.26)	(- . -)		(5.26)
5	- . -	*	1.78	1.78	*	2.91	- . -	*	2.91
			(4.91)	(4.91)		(4.57)			(4.57)
6	1.23	*	1.48	1.48	=	1.89	1.23	=	1.89
	(1.99)		(1.84)	(1.84)		(2.88)	(1.99)		(2.88)
7	4.07	*	3.29	3.29	*	3.53	4.07	*	3.53
	(7.67)		(4.66)	(4.66)		(8.14)	(7.67)		(8.14)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay for an increase in the average catch rate of king mackerel to 1 fish per trip by species targeting preferences is reported in Table 8-8. On a state-wide basis, average willingness to pay was $1.47 for near-shore anglers, $4.64 for offshore anglers, and $1.47 for anglers targeting all other species groups. As was the case in Table 8-7, statistical tests indicated that at the state level anglers targeting offshore species were willing to pay more, on average, than both, anglers targeting the "all other" species group category, and those individuals preferring near-shore species. On a regional basis, and considering only those cases having a sample variance greater than zero, average willingness to pay ranged between $1.37

and $1.89 for near-shore anglers, $1.59 and $9.92 for offshore anglers, and $0.76 and $2.55 for all other anglers. Across all regions, no difference in willingness to pay increase king mackerel catch rates was detected on the basis of species targeting preferences.

Table 8-8. Average Willingness to Pay for King Mackerel Catch Alternatives by Species Group Preferences, Florida and Regions (1:3 to 1:1 King Mackerel)

	1:3 to 1:1 King Mackerel								
Region	Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida	1.47 (3.45)[a]	≠	4.64 (9.97)	4.64 (9.97)	≠	1.47 (3.99)	1.47 (3.45)	=	1.47 (3.99)
Region 1	1.89 (2.95)	=	0.00 (0.00)	0.00 (0.00)	*	2.55 (5.34)	1.89 (2.95)	=	2.55 (5.34)
2	1.64 (5.50)	*	2.74 (3.99)	2.74 (3.99)	*	1.09 (4.82)	1.64 (5.50)	=	1.09 (4.82)
3	0.00 (0.00)	*	5.69 (5.30)	5.69 (5.30)	*	1.43 (2.75)	0.00 (0.00)	*	1.43 (2.75)
4	- . -	*	1.59 (3.97)	1.59 (3.97)	*	2.01 (5.21)	- . -	*	2.01 (5.21)
5	0.00 (- . -)	*	3.21 (5.88)	3.21 (5.88)	*	0.76 (1.96)	0.00 (- . -)	*	0.76 (1.96)
6	1.49 (3.19)	=	9.92 (16.82)	9.92 (16.82)	=	1.35 (2.82)	1.49 (3.19)	=	1.35 (2.82)
7	1.37 (2.63)	*	8.55 (10.40)	8.55 (10.40)	*	1.22 (2.06)	1.37 (2.63)	*	1.22 (2.06)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

8.4 Summary

In the preceding analysis, it was found that willingness to pay for a change in the current king mackerel bag limit to five fish per person per day was $2.05 at the state and ranged between $0.78 and $4.43 across all regions. Statistical tests indicated no difference in average willingness to pay between the five fish bag limit change and a ten fish bag. This finding means that, on average, the economic value of keeping more than five king mackerel is zero. Further analysis of the bag limit changes indicated that average willingness to pay was not affected by whether or not the angler owned a boat. However, on average, anglers expressing a preference for offshore game species were found to be willing to pay more than anglers expressing a preference for near-shore bottom fish species.

For management scenarios in which angler values were elicited for changes in average daily catch rates, average willingness to pay for a catch rate change from one fish in three trips to one fish in every two trips was $1.99 for the state and ranged from $1.18 to $3.17 across all regions. However, as was the case for the bag limit changes, no difference in average values were found between catching one fish in every two trips and catching one fish every trip. At the state level, further analysis showed that, on average, individuals that did not own a boat were willing to pay more for a catch rate change than individuals that did own a boat. Also, on average, anglers expressing a preference for offshore game species were found to be willing to pay more than anglers expressing a preference any other species group.

Across all management scenarios there were a large number of respondents that gave zero willingness to pay. This finding does not mean that these respondents did not place any economic value on catching king mackerel. Rather, it means that many anglers placed no economic value on the particular management changes that were presented. However, estimated standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero willingness to pay, there were some respondents that placed a high value on the proposed changes.

9. PACKAGE VALUATIONS

9.1 Average Willingness to Pay for Species Packages by All Anglers

In each of the previous sections, angler willingness to pay for management changes for individual species was reported. In each of these cases, anglers were asked to indicate their willingness to pay for a management change that would only affect a single species. In addition to these individual management changes, several scenarios were constructed in which the proposed management change would affect a group of species that, when considered together, form a package. For this study, bag limit changes for redfish, seatrout and mullet formed one such package, while pompano and sheepshead formed another. The species were grouped in this manner because proposed increases in bag limits were considered for redfish, seatrout, and mullet; proposed reductions in bag limits were considered for sheepshead and pompano. The package scenarios were formed because anglers may catch one or more of these species while fishing for another. Further, eliciting marginal values for a group of bag limit changes provides a comparison with marginal values elicited for bag limit changes for individual species.

Individuals may consider how the proposed management change might affect not only the particular species that is being valued but other related species as well. For example, consider an individual who was asked to value a change in redfish bag limits. In making a decision, that person would consider how such a change would affect redfish stocks and what value such a change might have. However, the individual may also consider how a change in redfish management might affect other targeted species. A change in redfish management may be perceived to affect seatrout. Thus, to the individual, the value of the change in redfish management may be related to how the change affects redfish and any other species that the individual believes will also be affected. This phenomenon has come to be referred to in the contingent valuation literature as the embedding effect; the value of related goods is embedded in the value of the good that is being valued. If the embedding effect is present, then the summation of one or more individual species valuations would be greater than if the individual were presented with each management change as a package. A test of whether the embedding effect is present in the data collected for this study provides a check point to evaluate the validity of responses to the contingent valuation process.

In all, four package scenarios were constructed. Package 1 consisted of bag limit changes for redfish (1 to 2 fish), seatrout (10 to 15 fish), and mullet (50 to 75 fish). Package 2 included bag limit changes for redfish (1 to 3 fish), seatrout (10 to 20 fish), and mullet (50 to 100) fish. Package 3 included bag limit reductions for sheepshead (no bag to 5 fish) and pompano (no bag to 2 fish). Last, package 4 consisted of bag limit changes for sheepshead (no bag to 10 fish) and pompano (no bag to 4 fish). As was the case for the individual species scenarios, each respondent was offered a package option and presented with the opportunity to purchase a license stamp that would permit the special harvesting privileges described in the package. Average willingness for each of the packages for Florida and regions is reported in Table 9-1.

Table 9-1. Average Willingness to Pay for Package Options by Region and Bag Limit

Region		Package 1 Redfish (1 to 2) Seatrout (10 to 15) Mullet (50 to 75)		Package 2 Redfish (1 to 3) Seatrout (10 to 20) Mullet (50 to 100)	Package 3 Sheepshead (5 to No Limit) Pompano (2 to No Limit)		Package 4 Sheepshead (10 to No Limit) Pompano (4 to No Limit)
Florida		2.48 (5.57)[a]	=	3.34 (8.27)	1.36 (4.07)	=	1.85 (6.46)
Region	1	3.55 (5.38)	=	4.92 (6.95)	2.12 (3.51)	=	1.71 (3.62)
	2	2.52 (6.53)	=	2.95 (8.78)	1.43 (5.31)	=	2.40 (9.05)
	3	4.38 (6.84)	=	2.44 (5.32)	1.22 (2.23)	≠	0.19 (0.89)
	4	1.75 (7.06)	=	4.74 (15.78)	0.00 (0.00)	=	3.33 (14.04)
	5	2.16 (6.08)	=	1.22 (3.90)	2.86 (8.38)	=	0.37 (1.59)
	6	1.49 (3.77)	≠	3.38 (8.23)	0.78 (2.42)	=	1.13 (3.32)
	7	2.84 (5.16)	=	3.76 (5.99)	0.47 (1.71)	≠	3.01 (5.36)

[a] Standard deviation reported in parentheses.

Average willingness to pay for package 1 was $2.48 for the state and ranged between a high of $4.38 in region 3 to a low of $1.49 in region 6. Average willingness to pay for package 2 was $3.34 for Florida and ranged between $1.22 in region 5 and $4.92 across all regions. Statistical tests to determine whether average willingness to pay differed across package scenarios indicated that, with one exception, there was no difference in average values for the state or regions. The exception was region 6 where, on average, respondents indicated a higher value for package 2 as compared to package 1.

Average willingness to pay for package 3 was $1.36 for the state and ranged between a high of $2.26 in region 5 to a low of $0.00 in region 4. Average willingness to pay for package 4 was $1.85 for Florida and ranged between $0.19 in region 3 and $3.33 across all regions. Statistical tests to determine whether average willingness to pay differed for these package scenarios indicated that with two exceptions, there was no difference in average values for the state or regions. In region 3 average willingness to pay for package 3 was greater than for package 4. By contrast, in region 7 average willingness to pay for package 4 was greater than for package 3.

9.1.1 Reasons for Zero Willingness to Pay for All Anglers

As in the individual species valuation scenarios, individuals who responded with a zero value for a package were asked their reason for such a value. The percentage of zero values and reasons for zero values are reported in Table 9-2. Overall, the percentage of zero values elicited for the packages ranged from 72.9 percent for package 1 to 83.7 percent for package 4. The majority (approximately 40 percent) of respondents indicated a zero value because they did not want to keep any more fish than they already did. The second most frequent reason was that respondents did not want to pay any more to fish than they already did. For packages 3 and 4 approximately one-fifth of zero values were because the respondent did not fish for sheepshead or pompano. A smaller percentage of zero values (less than 14 percent) were because respondents did not fish for mullet, seatrout, or redfish. Of the remaining reasons, no more than 7 percent indicated they release all fish they catch, or they believe current regulations are not enforced. Less than 6 percent did not know how much the proposed management change would be worth to them.

Table 9-2. Reasons for Stating Zero Willingness to Pay for a King Mackerel Stamp (Percentages)

	Package 1	Package 2	Package 3	Package 4
Reason	Redfish (1 to 2) Seatrout (10 to 15) Mullet (50 to 75)	Redfish (1 to 3) Seatrout (10 to 20) Mullet (50 to 100)	Sheepshead (5 to No Limit) Pompano (2 to No Limit)	Sheepshead (10 to No Limit) Pompano (4 to No Limit)
Percentage of Zero Values	72.9	72.7	81.6	83.7
Do Not Fish for the Species	13.7	11.4	26.6	27.1
Always Release all Fish	6.6	7.0	4.9	5.3
Do Not Want to Keep any More Fish	39.3	43.3	NA[a]	NA
Proposed Bag Limits Were Enough	NA	NA	36.5	42.7
Current Regulations are not Enforced	7.1	6.0	3.4	3.6
Do Not Want to Pay More to Fish	29.5	26.4	24.6	19.6
Do Not Know the Value of the Proposed Change	3.8	6.0	3.9	1.8

[a]Not Applicable.

9.2 Average Willingness to Pay for Species Packages By Boat Ownership

Unless otherwise exempt, a resident must hold a Florida saltwater fishing license if fishing from a boat. Thus, boat owners are likely to have already purchased a saltwater fishing license and may feel that they have already paid for the right to fish. Further, boat ownership offers greater access to fishery resources. Equity concerns, particularly with respect to income, were an important rationale for the various exemptions provided under the legislation creating the saltwater fishing license. Boat ownership is likely to be correlated with income. For these reasons, average willingness to pay for changes in management policy were hypothesized to differ between boat owners and all other anglers.

Average willingness to pay for each package scenario by boat ownership status is reported in Table 9-3 for packages 1 and 2 and Table 9-4 for packages 3 and 4. For boat owners, average willingness to pay for package 1 was $2.23 for Florida and ranged between $1.25 and $3.28 across all regions. For anglers who did not own a boat, average willingness to pay was $2.83 for the state and ranged from a low of $0.00 in region 4 to a high of $7.30 in region 3. For Florida and across all regions no difference was found in willingness to pay for package 1 on the basis of boat ownership.

Among boat owners, average willingness to pay for package 2 was $3.27 at the state level and ranged between $0.41 and $5.22 across all regions. For all other anglers, the average was $3.44 for the state and ranged from $1.65 to $4.91 across all regions. There was no statistical difference in average willingness to pay for package 2 between boat owners and anglers who did not own a boat.

Average willingness to pay for package 3 was $0.83 for Florida boat owners and ranged from a high of $1.63 in region 5 to $0.00 in region 4. For anglers who did not own a boat, average willingness to pay was $2.11 for the state and ranged between $0.00 and $4.07. For the state and all regions, no difference in average willingness to pay was found between boat owners and anglers that did not own a boat.

Average willingness to pay for package 4 was $1.84 for boat owners at the state level and ranged between $0.00 and $3.51. For anglers who did not own a boat, the average was $1.87 for the state and ranged between $0.27 and $3.35. Once again, no difference was found on the basis of boat ownership in average willingness to pay for package 4 for the state or regions.

Table 9-3. Average Willingness to Pay for Redfish/Seatrout/Mullet Package Options by Boat Owners and All Other Anglers, Florida and Regions (Packages 1 and 2)

Region		Package 1			Package 2		
		Boat Owner		All Others	Boat Owner		All Others
Florida		2.23 (4.96)[a]	=	2.83 (6.41)	3.27 (8.30)	=	3.44 (8.26)
Region	1	3.05 (5.10)	=	4.83 (6.03)	4.93 (6.18)	=	4.91 (8.37)
	2	1.96 (4.36)	=	3.11 (8.33)	2.09 (5.26)	=	3.75 (11.13)
	3	2.95 (5.31)	*	7.30 (9.01)	2.12 (3.59)	*	2.82 (7.08)
	4	2.55 (8.41)	*	0.00 (0.00)	5.22 (16.84)	*	1.65 (3.94)
	5	1.82 (4.31)	*	2.47 (7.52)	0.41 (1.86)	*	2.04 (5.09)
	6	1.25 (3.47)	=	1.84 (4.21)	3.12 (8.77)	=	3.66 (7.78)
	7	3.28 (6.13)	*	2.41 (4.08)	3.40 (5.40)	*	4.22 (6.85)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

9.3 Average Willingness to Pay for Species Packages By Species Targeting Preference

Individual anglers may prefer to target a specific species. Thus, an individual exhibiting such targeting preferences may hold a greater value for that species as compared to other species. In the mail survey, species targeting preferences were elicited by querying each angler as to the percentage of time (of their total time spent fishing) they spent targeting specific groups of species where species groups were determined by similarities in habitat and range. These species groups were: reef fish (grouper, snapper, cobia, amberjack), near-shore bottomfish (redfish, seatrout, sheepshead, mullet, and pompano), offshore small game (king and spanish mackerel), offshore big game (marlin, sailfish, dolphin), inshore game (tarpon, snook, bonefish) and other (any other species). To determine targeting preferences, the species group receiving the greatest percentage allocation of total fishing time was identified as the preferred species group for that particular angler.

Table 9-4. Average Willingness to Pay for Sheepshead and Pompano Package Options by Boat Owners and All Other Anglers, Florida and Region (Packages 3 and 4)

	Package 3			Package 4		
Region	Boat Owner		All Others	Boat Owner		All Others
Florida	0.83	=	2.11	1.84	=	1.87
	(2.60)[a]		(5.54)	(6.59)		(6.31)
Region 1	1.30	=	4.07	1.82	=	1.50
	(3.09)		(4.05)	(4.05)		(2.60)
2	0.43	=	2.49	2.05	=	2.74
	(1.31)		(7.46)	(6.11)		(11.30)
3	0.72	*	2.19	0.00	*	0.42
	(1.33)		(3.29)	(0.00)		(1.33)
4	0.00	*	0.00	3.51	*	2.49
	(0.00)		(0.00)	(15.35)		(3.95)
5	1.63	*	3.96	0.46	*	0.27
	(4.19)		(10.95)	(1.94)		(1.17)
6	0.95	=	0.55	0.64	=	1.66
	(2.76)		(1.83)	(1.99)		(4.27)
7	0.80	*	0.17	2.74	*	3.35
	(2.38)		(0.51)	(5.20)		(5.74)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay for package 1 by species targeting preferences is reported in Table 9-5. For the state, average willingness to pay was $2.57 for near-shore anglers, $0.84 for offshore anglers, and $3.52 for anglers targeting all other species groups. For the state, average willingness to pay was greater for anglers in the "all other" species group category as compared to offshore anglers. No difference was found in average willingness to pay between near-shore anglers and offshore anglers or between near-shore anglers and anglers targeting the all other species group category. This lack of transitivity across groups mean comparisons is a common problem in this type of statistical analysis. Due to the number of categories created in Table 9-5, regional analysis of average willingness to pay was difficult due to the relatively small number of observations in each cell. Cells in which there are no observations are denoted by dashed lines (- -) and cells in which there is only one observation or all observations are the same are distinguished by the fact that they have a sample variance of zero.

Table 9-5. Average Willingness to Pay for Redfish/Seatrout/Mullet Package Options by Species Group Preferences, Florida and Regions (Package 1)

		Package 1								
Region		Near-Shore		Offshore		Offshore		All Others	Near-Shore		All Others
Florida		2.57	=	0.84		0.84	≠	3.52	2.57	=	3.52
		(5.16)[a]		(4.20)		(4.20)		(6.76)	(5.16)		(6.76)
Region	1	4.12	=	0.63		0.63	*	4.84	4.12	=	4.84
		(5.78)		(1.30)		(1.30)		(6.13)	(5.78)		(6.13)
	2	2.41	*	0.00		0.00	*	4.08	2.41	=	4.08
		(4.73)		(0.00)		(0.00)		(9.14)	(4.73)		(9.14)
	3	0.00	*	-.-		-.-	*	7.87	0.00	*	7.87
		(0.00)						(8.28)	(0.00)		(8.28)
	4	-.-	*	3.88		3.88	*	0.89	-.-	*	0.89
				(11.46)		(11.46)		(4.11)			(4.11)
	5	0.00	*	0.00		0.00	*	4.58	0.00	*	4.58
		(0.00)		(0.00)		(0.00)		(7.84)	(0.00)		(7.84)
	6	1.93	*	0.00		0.00	=	1.87	1.93	=	1.87
		(5.18)		(0.00)		(0.00)		(4.04)	(5.18)		(4.04)
	7	2.92	*	0.00		0.00	*	5.17	2.92	*	5.17
		(5.42)		(0.00)		(0.00)		(6.46)	(5.42)		(6.46)

[a]Standard deviation reported in parentheses.
*Sample size less than 30.

Considering only those cases where the sample variance was greater than zero, average willingness to pay for package 1 ranged from $1.93 and $4.12 for near-shore anglers, $0.63 and $3.88 for offshore anglers, and $0.89 and $7.87 for anglers targeting all other species groups. Across all regions there was no difference in average willingness to pay for package 1 for the three groups of respondents.

Average willingness to pay for package 2 by species targeting preferences is reported in Table 9-6. For the state, average willingness to pay was $4.03 for near-shore anglers, $1.82 for offshore anglers, and $3.35 for anglers targeting all other species groups. For the state, no difference in average willingness to pay for package 2 was found on the basis of species targeting preferences. Considering only those cases where the sample variance was greater than zero, average willingness to pay for package 2 ranged from $2.08 and $6.20 for near-shore anglers, $0.82 and $3.86 for offshore anglers, and $1.46 and $5.20 for anglers targeting all other species groups. Across all species group targeting preferences and regions no difference in average willingness to pay for package 2 was found.

Table 9-6. Average Willingness to Pay for Redfish/Seatrout/Mullet Package Options by Species Group Preferences, Florida and Regions (Package 2)

		Package 2								
Region		Near-Shore		Offshore		Offshore		All Others	Near-Shore		All Others
Florida		4.03* (7.15)	=	1.82 (4.26)		1.82 (4.26)	=	3.35 (9.60)	4.03 (7.15)	=	3.35 (9.60)
Region	1	4.94 (6.73)	=	3.86 (5.48)		3.86 (5.48)	*	2.98 (3.97)	4.94 (6.73)	=	2.98 (3.97)
	2	2.08 (5.76)	*	-.-		-.-	=	3.67 (10.54)	2.08 (5.76)	=	3.67 (10.54)
	3	0.00 (0.00)	*	-.-		-.-	*	1.49 (3.11)	0.00 (0.00)	*	1.49 (3.11)
	4	-.-	*	3.47 (7.81)		3.47 (7.81)	*	5.20 (18.64)	-.-	*	5.20 (18.64)
	5	0.00 (-.-)	*	1.24 (1.87)		1.24 (1.87)	*	1.46 (4.31)	0.00 (-.-)	*	1.46 (4.31)
	6	5.47 (8.89)	=	0.82 (1.87)		0.82 (1.87)	=	3.40 (10.00)	5.47 (8.89)	=	3.40 (10.00)
	7	6.20 (7.01)	*	3.80 (5.15)		3.80 (5.15)	*	2.60 (6.10)	6.20 (7.01)	*	2.60 (6.10)

*Standard deviation reported in parentheses.
*Sample size less than 30.

Average willingness to pay for package 3 by species targeting preferences is reported in Table 9-7. For the state, average willingness to pay was $0.99 for near-shore anglers, $1.82 for offshore anglers, and $3.35 for anglers targeting all other species groups. For the state, average willingness to pay was greater for anglers in the "all other" species group category as compared to offshore anglers. No difference was found in average willingness to pay between near-shore anglers and offshore anglers or between near-shore anglers and anglers targeting the all other species group category. Considering only those cases where the sample variance was greater than zero, average willingness to pay for package 3 ranged from $0.00 and $2.45 for near-shore anglers, $0.00 and $2.01 for offshore anglers, and $0.00 and $6.07 for anglers targeting all other species groups. Across all species group targeting preferences and regions no difference in average willingness to pay for package 3 was found.

Table 9-7. Average Willingness to Pay for Sheepshead and Pompano Package Options by Species Group Preferences, Florida and Regions (Package 3)

		Package 3								
Region		Near-Shore		Offshore		Offshore		All Others	Near-Shore		All Others
Florida		0.99 (2.99)*	=	0.20 (1.40)		0.20 (1.40)	≠	2.12 (5.45)	0.99 (2.99)	=	2.12 (5.45)
Region	1	2.45 (4.05)	=	2.01 (2.81)		2.01 (2.81)	•	2.26 (3.25)	2.45 (4.05)	=	2.26 (3.25)
	2	0.87 (2.73)	•	0.00 (0.00)		0.00 (0.00)	•	2.61 (7.95)	0.87 (2.73)	=	2.61 (7.95)
	3	0.00 (0.00)	•	-.-		-.-	•	1.66 (1.81)	0.00 (0.00)	•	1.66 (1.81)
	4	-.-	•	0.00 (0.00)		0.00 (0.00)	•	0.00 (0.00)	-.-	•	0.00 (0.00)
	5	0.00 (0.00)	•	0.00 (0.00)		0.00 (0.00)	•	6.07 (10.95)	0.00 (0.00)	•	6.07 (10.95)
	6	0.00 (0.00)	•	0.00 (0.00)		0.00 (0.00)	=	0.87 (1.93)	0.00 (0.00)	=	0.87 (1.93)
	7	0.60 (2.09)	•	0.00 (0.00)		0.00 (0.00)	•	0.42 (0.82)	0.60 (2.09)	•	0.42 (0.82)

*Standard deviation reported in parentheses.
•Sample size less than 30.

Average willingness to pay for package 4 by species targeting preferences is reported in Table 9-8. For the state, average willingness to pay was $1.79 for near-shore anglers, $1.38 for offshore anglers, and $2.15 for anglers targeting all other species groups. For the state, no difference in average willingness to pay for package 4 was found on the basis of species targeting preferences. Considering only those cases where the sample variance is greater than zero, average willingness to pay for package 4 ranged from $0.85 and $3.58 for near-shore anglers, $0.45 to $3.80 for offshore anglers, and $0.85 and $3.58 for anglers targeting all other species groups. Across all regions no difference in average willingness to pay for package 4 was found.

Table 9-8. Average Willingness to Pay for Sheepshead and Pompano Package Options by Species Group Preferences, Florida and Regions (Package 4)

		Package 4								
Region		Near-Shore		Offshore	Offshore		All Others	Near-Shore		All Others
Florida		1.79 (4.59)*	=	1.38 (3.36)	1.38 (3.36)	=	2.15 (8.43)	1.79 (4.59)*	=	2.15 (8.43)
Region	1	2.53 (4.96)	=	0.00 (0.00)	0.00 (0.00)	*	1.04 (1.64)	2.53 (4.96)	=	1.04 (1.64)
	2	0.85 (2.91)	*	-.-	-.-	=	3.57 (11.34)	0.85 (2.91)	=	3.57 (11.34)
	3	0.00 (0.00)	*	-.-	-.-	*	0.00 (0.00)	0.00 (0.00)	*	0.00 (0.00)
	4	-.-	*	3.87 (6.46)	3.87 (6.46)	*	3.38 (17.04)	-.-	*	3.38 (17.04)
	5	0.00 (0.00)	*	0.45 (1.94)	0.45 (1.94)	*	0.35 (1.31)	0.00 (0.00)	*	0.35 (1.31)
	6	1.81 (4.72)	=	0.82 (1.87)	0.82 (1.87)	=	0.84 (2.66)	1.81 (4.72)	=	0.84 (2.66)
	7	3.58 (5.94)	*	3.80 (5.15)	3.80 (5.15)	*	2.60 (6.10)	3.58 (5.94)	*	2.60 (6.10)

*Standard deviation reported in parentheses.
'Sample size less than 30.

9.4 Individual Valuation and Package Comparison

Each of the package scenarios was a composite of bag limit changes for two or more individual species. The package scenarios were developed because anglers may catch one or more species while targeting another. Further, the package valuations provide an opportunity to compare values elicited for individual species with willingness to pay for the same species when considered as part of a group. For this comparison, a hypothesis test was constructed by summing the average values for each individual species scenario (as reported in the preceding sections for each species) and comparing that sum to the average value elicited for an equivalent package. The hypothesis tests were conducted using the Tukey test described in section 1. The test results are reported in Table 9-9 for packages 1 and 2, and in Table 9-10 for packages 3 and 4.

For package 1, the sum of average values for individual species was $3.96 for the state and ranged from a high of $10.23 in region 4 to a low of $2.22 in region 1. By comparison, average values for package 1 were $2.48 for Florida and ranged between $1.75 and $4.38. However, statistical tests indicated that, with one exception, there was no difference in average willingness to pay between the package and individual species sums across all regions and the

state. In region 1, average willingness to pay was greater for package 1 than for the sum of individual species average values.

Table 9-9. Hypothesis Test for Equality Between the Sum of Individual Species Valuation and Package Valuation, Florida and Regions (Packages 1 and 2)

Region		Individual Valuation		Package 1	Individual Valuation		Package 2
		Redfish (1 to 2) + Seatrout (10 to 15) + Mullet (50 to 75)		Redfish (1 to 2) Seatrout (10 to 15) Mullet (50 to 75)	Redfish (1 to 3) + Seatrout (10 to 20) + Mullet (50 to 100)		Redfish (1 to 3) Seatrout (10 to 20) Mullet (50 to 100)
Florida		3.96 (19.25)[a]	=	2.48 (5.57)	4.76 (15.05)	≠	3.34 (8.27)
Region	1	2.22 (5.38)	≠	3.55 (5.38)	6.34 (11.75)	=	4.92 (6.95)
	2	2.44 (8.45)	=	2.52 (6.53)	3.48 (9.84)	=	2.95 (8.78)
	3	3.22 (8.45)	=	4.38 (6.84)	5.34 (12.03)	=	2.44 (5.32)
	4	10.23 (43.63)	=	1.75 (7.06)	2.34 (8.04)	=	4.74 (15.78)
	5	2.99 (12.05)	=	2.16 (6.08)	4.25 (15.76)	=	1.22 (3.90)
	6	5.07 (19.31)	=	1.49 (3.77)	5.39 (17.32)	=	3.38 (8.23)
	7	3.64 (7.78)	=	2.84 (5.16)	6.91 (15.49)	=	3.76 (5.99)

[a] Standard deviation reported in parentheses.

For package 2, the sum of average individual species values was $4.76 for the state and ranged from $2.34 in region 4 to $6.91 in region 7. By comparison, average willingness to pay for package 2 was $3.34 for the state and ranged between $1.22 and $4.92. A statistical test indicated that, for the state, the sum of individual species average values was greater than average willingness to pay for package 2. Across all regions, however, no difference in willingness to pay was found between the package values and the sum of individual species values.

For package 3 (Table 9-10), the sum of average values for individual species was $2.45 for the state and ranged from a high of $6.07 in region 3 to a low of $1.67 in region 6. By comparison, average values for the equivalent package were $1.36 for Florida and ranged between $0.00 and $2.86. For the state and region 7, statistical tests indicated that the sum of individual species' average willingness to pay was greater than average willingness to pay for

package 3. In all other instances, however, no differences were found in average willingness to pay.

For package 4, the sum of average values for individual species was $1.66 for the state and ranged from a high of $4.07 in region 5 to a low of $0.89 in region 1. By comparison, average values for package 4 were $1.85 for Florida and ranged between $0.37 and $3.33. For regions 3 and 6, statistical tests indicated that the sum of individual species' average willingness to pay was greater than average willingness to pay for package 3. In contrast, for the state and region 7 average willingness to pay for package 4 was greater than the sum of average values for individual species. In all other instances, no difference in average willingness to pay was detected.

Table 9-10. Hypothesis Test for Equality Between the Sum of Individual Species Valuation and Package Valuation, Florida and Regions (Packages 3 and 4)

	Individual Valuation		Package 3	Individual Valuation		Package 4
Region	Sheepshead (5 to No Limit) + Pompano (2 to No Limit)		Sheepshead (5 to No Limit) Pompano (2 to No Limit)	Sheepshead (10 to No Limit) + Pompano (4 to No Limit)		Sheepshead (10 to No Limit) Pompano (4 to No Limit)
Florida	2.45 (8.65)[a]	≠	1.36 (4.07)	1.66 (5.35)	≠	1.85 (6.46)
Region 1	1.84 (5.48)	=	2.12 (3.51)	0.89 (2.99)	=	1.71 (3.62)
2	1.84 (8.22)	=	1.43 (5.31)	1.09 (4.50)	=	2.40 (9.05)
3	6.07 (16.77)	=	1.22 (2.23)	1.49 (4.03)	≠	0.19 (0.89)
4	1.87 (7.66)	=	0.00 (0.00)	1.61 (6.47)	=	3.33 (14.04)
5	5.03 (17.92)	=	2.86 (8.38)	4.07 (10.97)	=	0.37 (1.59)
6	1.67 (4.45)	=	0.78 (2.42)	1.86 (4.59)	≠	1.13 (3.32)
7	2.85 (6.01)	≠	0.47 (1.71)	1.47 (3.69)	≠	3.01 (5.36)

[a] Standard deviation reported in parentheses.

9.5 Summary

In the preceding analyses, willingness to pay for management changes in four package contexts were reported. Average values for packages offering changes in redfish, seatrout, and mullet bag limits to two, 15 and 75 fish respectively, were $2.48 at the state level and ranged between $1.49 and $4.38 across all regions. At the state level, no difference in average willingness to pay was found between this package and package 2 which offered higher bag limit

changes. However, in region 6 average willingness to pay was higher for package 2 with higher bag limit changes. Average values for package 3 offering changes in sheepshead and pompano bag limits to two and five fish respectively, were $1.36 at the state level and ranged between $0.00 and $2.86 across all regions. At the state level, no difference in average willingness to pay was found between this package and package 4 offering higher bag limit changes. In region 7, average willingness to pay was higher for package 4 with higher bag limit changes but in region 3 willingness to pay was greater for package 1 offering more restrictive bag limit changes.

Further analysis of the package valuations showed no difference in average values on the basis of boat ownership. On average, at the state level, anglers expressing a preference for inshore game, reef fish, and miscellaneous other species groups were willing to pay more for packages 1 (lower bag limit changes for redfish, seatrout, and mullet) and 3 (more restrictive bag limit changes for sheepshead and pompano) than anglers preferring the offshore game species group.

Across all management scenarios there were a large number of respondents who gave zero values. This finding does not mean that these respondents did not place any economic value on access to one or more of the species considered. Rather, it means that many anglers placed no value on the particular management changes that were presented. However, estimated standard deviations were quite large across all management changes. Thus, while the majority of respondents gave zero values, there were some respondents who placed a high value on the proposed changes.

The last test that was conducted was a test of whether the sum of individual species valuations was equal to an equivalent package. This test was conducted due to the concern that individuals may consider how a proposed management change might affect not only the particular species that is being valued but other related species as well. For example, consider an individual who was asked to value a change in redfish bag limits. In making a decision, that person would consider how such a change would affect redfish stocks and what value such a change might have. However, the individual may also consider how a change in redfish management might affect other targeted species. A change in redfish management may be perceived to affect seatrout. Thus, to the individual, the value of the change in redfish management may be related to how the change affects redfish and any other species that the individual believes will also be affected. This phenomenon has come to be referred to in the contingent valuation literature as the embedding effect; the value of related goods is embedded in the value of the good that is being valued. If the embedding effect is present, then the summation of one or more individual species valuations would be greater than if the individual was presented with all management change as a package.

The results of this study showed that at the state level, in three of the four hypothesis tests conducted for the embedding effect, the sum of individual package valuations were greater than the mean for an equivalent species package. On a regional basis, there were five cases in which the sum of individual species values differed from their equivalent packages. Of these

five cases, there were three instances in which the sum of individual valuations exceeded the package values. Thus, on a state-wide and on a regional basis, some evidence exists to support the existence of an embedding effect in the individual species valuations elicited through this study.

10. USING MARGINAL ECONOMIC VALUES IN FISHERIES MANAGEMENT

10.1 Introduction

The preceding sections have provided results from the contingent valuation survey of anglers' willingness to pay for various marginal changes in near-shore fishery regulations. As discussed in Section 2, this valuation analysis was designed to consider increases and decreases from current bag limits and catch rates. The analysis was not intended, and should not be used, to estimate the value of access to Florida's fisheries. None of the management alternatives considered in this analysis addressed the effects of oil spills or habitat destruction that would limit or curtail access to fisheries in specific regions of the state.

This section describes how the marginal change scenarios included in this analysis can be used in economic evaluations of fisheries management decisions. There are two basic ways that the valuation results can be used. The first is fairly direct and involves a simple extrapolation from the sample results to the population of resident anglers in Florida. The second way is based on marginal values per fish that can be derived from the valuation results. Both ways of using the survey results are discussed below.

10.2 Extrapolating Sample Results to the Population

The survey design for this study was intended to provide valuation estimates for the state of Florida and the regions described previously in Section 2. The sample results can be extended to the state or regional level using population estimates, the marine fishing participation rate, and the applicable marginal value for a change in fishery regulations. This procedure can be summarized in the equation:

$$\text{Residents}_i \times \text{Participation Rate}_i \times \text{Marginal Value}_{ij} = \text{Total Marginal Value}_{ij}$$

where subscript i refers to the state or region and subscript j refers to the management change for a particular near-shore species. The marginal value estimates derived from the contingent valuation survey are reported in this publication; estimates of the number of residents and the participation rate for the state and regions, in 1991-1992 and through the year 2010, are reported in the publication, A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing, J. Walter Milon et al., Florida Sea Grant Report (in press). A summary of the number of resident marine fishing participants (the product of $\text{Residents}_i \times \text{Participation Rate}_i$) in 1991-1992 is provided in Table 10-1.

The use of this equation to estimate the total marginal value of a change in fishery regulations can be illustrated with some examples. In Table 3-1 it was reported that the average respondent's marginal value for a change in the bag limit for redfish from 1 to 2 fish (with no change in size limits) was $1.94. Multiplying the marginal value for an average angler times

the total number of resident anglers in Florida in 1991-1992 (2,302,500 from Table 10-1) yields a total marginal value of $4,466,850. This is an estimate of the economic value of this change in redfish bag limits. This estimate of economic benefits is based only on the direct benefits to anglers and does not consider the costs of increasing the bag limit. These costs might include the construction and operating expenses for a redfish hatchery that could help to sustain higher rates of harvesting from the redfish stock. Thus, the estimated total marginal value should not be considered in isolation.

Table 10-1. Estimated Number of Resident Marine Fishing Participants for Florida and Regions, 1991-1992

Area	Number of Participants
Florida	2,302,500
Regions	
1 Northwest	305,523
2 West Central	459,521
3 Southwest	112,900
4 Dade/Monroe	331,635
5 Broward/Palm Beach	403,510
6 East Central	483,346
7 Northeast	206,066

Source: Milon et al. (1993).

Similarly, the value of a change in regulations could be considered for a specific region. For example, the marginal value of a change in redfish bag limits from 1 to 2 fish in region 3 was reported in Table 3-1 to be $1.85. Based on an estimated 112,900 anglers in this region, the total marginal value would be $208,865. The same calculations could be conducted for other regions to show how total marginal value can differ across regions. For example, Region 6 has 483,346 resident anglers who have an average value of $1.47 for a 2 redfish bag limit which would yield an estimate of $710,519 as the total marginal value in this region. Similar calculations could be made for changes in management of other species.

The analysis for redfish in Section 3 also showed that there was no statistical difference in average values for increases in redfish bag limits to 2 redfish or 3 redfish. This result meant that anglers did not place a higher value on a higher bag limit so the marginal value of increasing the bag limit from 2 to 3 redfish would be zero. Therefore, it would be incorrect to add together the total marginal value of a 2 redfish bag limit and a 3 redfish bag limit to estimate the total economic value of a 3 redfish bag limit. Based on the statistical results reported here, there would no difference in the total marginal economic benefits of these bag limits.

On the other hand, suppose an increase in redfish bag limits was being considered along with a provision to allow one fish over 27 inches. In this case, it would be appropriate to add together the total values for the bag limit and maximum size changes because each value applies to a different marginal change in catch regulations. Thus, the combined economic benefits from these changes would be $4,466,850 plus $3,453,750 ($1.50, from Table 3-1, times 2,302,500 anglers), or $7,920,600.

Extrapolating sample results to the total population of anglers also shows how the economic value of management changes varies across species. For example, the value of an increase in the bag limit for mullet from 50 to 75 fish would be $1,519,650 (average value of $0.66, from Table 5.1, times 2,302,500 anglers). Compared to the total economic value of $4.47 million for a 1 fish increase in the redfish bag limit, it is apparent that resident anglers place a much higher value on catching and keeping redfish than mullet.

Finally, it is useful to remind the reader that the marginal value estimates for sheepshead and pompano have a different interpretation than the results for other species. Since these species do not have bag limits under current regulations, the estimated marginal values reported in Sections 6 and 7 are anglers' average willingness to pay to avoid specific bag limits for these species. The marginal value estimates reflect the potential lost benefits (costs) from bag limits for these species. Therefore, the total marginal costs to all anglers in Florida from a 4 fish bag limit for pompano would $1,496,625 ($0.65, from Table 7-1, times 2,302,500 anglers). This estimate of the economic cost of a bag limit regulation on pompano should be weighed against the economic benefits.

10.3 Derived Values Per Fish for Individual Species

An alternative way that the valuation results could be used in fishery management evaluation is based on per fish values that can be derived for each management scenario. This approach uses the marginal change in bag limits or catch rates stated in each scenario to compute a value for a 1 fish change. For example, the average value of a hypothetical increase in the redfish bag limit from 1 to 2 fish was $1.94 (Table 3-1). Since this was a 1 fish change, the implicit value of an additional redfish would be $1.94 ($1.94/1 = $1.94). Similarly, the average value of a hypothetical increase in the seatrout bag limit from 10 to 15 fish was $1.35 (Table 4-1). In this case the marginal change was 5 fish so the implicit value of an additional seatrout would be $0.27 ($1.35/5 = $0.27).

These calculations of the implicit value of a fish are based on a simple formula (Marginal Valuation / Marginal Change) that masks a more complex problem. The problem is that anglers' willingness to pay for a higher bag limit will be based on the number of times they expect to benefit from the higher bag limit. They might expect to keep the additional fish allowed under the new bag limit on only one trip, or they might expect to benefit on every trip. This is important because the number of times the higher bag limit is used actually determines the size of the marginal change in the number of fish harvested. For example, suppose an

angler expected to catch a bag limit of 2 redfish on 5 trips during the year. He indicated a willingness to pay of $1.94 for a redfish stamp that would allow him to harvest 1 additional redfish per trip over the current bag limit of 1 redfish. The implicit value of an additional redfish to this angler would then be $1.94 divided by 5, or $0.39 per redfish. In this case, 5 redfish is the expected marginal benefit that this angler would enjoy with a redfish stamp allowing him to harvest 2 redfish per trip instead of the current limit of 1 fish per trip. Thus, the proper formula to determine the implicit value per fish from the valuation responses in the mth management scenario for a species is:

$$\text{Marginal Valuation}_m \;/\; \text{Expected Marginal Change}_m = \text{Value Per Fish}_m$$

Since it is impossible to know how often individual anglers expected to benefit from a different bag limit when they expressed a willingness to pay for (or to avoid) a new bag limit, the best that can be done is to use different assumptions about the number of trips an angler would benefit from the new bag limit. A proxy for the expected marginal change would then be estimated with the formula:

$$\text{Change in Bag Limit} \times \text{Number of Trips} = \text{Expected Marginal Change}$$

This proxy could then be used in the formula above to estimate the implicit value per fish. For example, if we assume the 2 redfish bag limit would apply on only 1 trip and the average angler's valuation of a 2 redfish bag limit was $1.94, the value per redfish would be:

$$\$1.94 \;/\; (1 \times 1) = \$1.94.$$

Or, if we assume the higher bag limit would apply on 5 trips, the value per redfish would be:

$$\$1.94 \;/\; (1 \times 5) = \$0.39.$$

Similar calculations could be made from the valuation results reported for the other management scenarios for redfish or the other species described in the previous sections.

The first column in Table 10-2 shows the implicit value per fish for each species and management scenario using the approach described above based on the average value per angler (from the tables in previous sections) and an assumption that the number of trips when the management change would apply would be 1. This assumption about the number of trips leads to an upper bound on the value per fish since any higher number of trips would increase the size of the expected marginal change causing a decrease in the derived value per fish. In general, the implications of these results are consistent with the earlier results. For example, the average value of $1.94 per redfish based on a 1 fish increase in the redfish bag limit is considerably higher than the average value of $0.03 per mullet based on a 25 fish increase in the mullet bag limit. Similarly, the average value of $0.27 per seatrout is also considerably higher than the value per mullet.

Table 10-2. Marginal Value Per Fish for Florida Near-Shore Species at Different Points on the Frequency Distribution of Angler Responses, Assuming One Trip per Angler

Species and Valuation Scenario	Average	50th Percentile	75th Percentile	95th Percentile
REDFISH				
Bag Limit				
1 to 2	$1.94	$0.00	$0.00	$10.00
1 to 3	$1.44	$0.00	$1.50	$ 7.50
Average Catch				
2 to 3	$2.15	$0.00	$3.00	$10.00
2 to 4	$1.21	$0.00	$2.50	$ 5.00
SEATROUT				
Bag Limit				
10 to 15	$0.27	$0.00	$0.00	$ 2.00
10 to 20	$0.12	$0.00	$0.00	$ 1.00
Average Catch				
3 to 5	$0.87	$0.00	$1.00	$ 5.00
3 to 7	$0.42	$0.00	$0.50	$ 2.50
MULLET				
Bag Limit				
50 to 75	$0.03	$0.00	$0.00	$0.08
50 to 100	$0.01	$0.00	$0.00	$0.00
SHEEPSHEAD				
Bag Limit				
None to 10	$0.20	$0.00	$0.00	$1.00
None to 5	$0.10	$0.00	$0.00	$0.50
POMPANO				
Bag Limit				
None to 4	$0.11	$0.00	$0.00	$ 0.83
None to 2	$0.29	$0.00	$0.00	$ 1.25
KING MACKEREL				
Bag Limit				
2 to 5	$0.68	$0.00	$0.00	$ 3.33
2 to 10	$0.29	$0.00	$0.00	$ 1.25
Average Catch				
1 to 2 every 3rd trip	$5.97	$0.00	$3.00	$30.00
1 every 3rd trip to 1 every trip	$2.78	$0.00	$0.00	$15.00

As with the results presented earlier, the reader should interpret the results carefully. For example, the value per redfish based on a 1 fish increase in the bag limit is $1.94 and it is $1.44 based on a 2 fish increase in the bag limit. The analysis in Section 3, however, showed that the average value for a 1 fish increase was no different statistically than the average value for a 2 fish increase in redfish bag limits. Thus, it would not be appropriate to assume that there is any difference in the 2 values per redfish. It is best to assume that the average value per redfish, based on bag limit increases, is in the range of $1.44 to $1.94. Similar interpretations should be used based on the analysis of statistical differences in previous sections.

The remaining columns in Table 10-2 show another aspect of the value per fish calculations that the reader should understand. The average values presented in the previous sections, which were used for the value per fish in the first column, represent the average response in the sample. As with any average, some responses will be lower while others will be higher. The additional columns in Table 10-2 show just how much variation there is in anglers' valuation of near-shore species. The second column, for example, shows that 50 percent of the respondents would place a value of $0.00 on any of the per fish changes in bag limits or catch rates. This "median" response is the middle of the distribution of marginal values and indicates that the majority of anglers would not be willing to pay for any of the described management changes.

The third column shows that, in many cases, the average values are higher than the values given for each species by 75 percent of the respondents. It is only in the last column showing the 95th percentile of the distribution of angler responses that the values per fish exceed the average values in the first column. This shows that, in most cases, the average values are determined by a relatively small number of respondents who placed a relatively high value on the management change. These "high" values do not reflect the preferences of a large number of anglers but they are, nevertheless, a legitimate expression of these anglers' value for changes in management of the fishery resource.

Finally, it was pointed out above that the assumption of only 1 trip on which the management change used for valuation would apply yielded an upper bound on the implicit value per fish. There are several possible ways to modify this assumption but the simplest way is to assume that the change would apply on the average number of trips made by all respondents in the sample. For this sample, the average number of fishing trips was 18. Thus, the values in Table 10-2 could be divided by 18 to derive an alternative estimate of the implicit value per fish based on a different assumption about anglers' expected benefits under each of the hypothetical near-shore fishery management changes.

10.4 A Comparison with Results from Other Contingent Valuation Studies

The number of prior studies of marine recreational fishing values in Florida, or in the U.S., is relatively small. A recent review by Freeman for the U.S. Environmental Protection Agency lists 23 studies throughout the U.S. and Canada that provided estimates of the economic

value of marine recreational fishing. All of these studies focused on the economic value of access to marine fishing in general or the value of changes in average catch rates. Most of the studies used a travel cost method of valuation based on anglers' trip data for specific fishing sites or species. Of the few studies where the contingent valuation method was used, none of the studies provided economic values for changes in bag limits or other regulations as was the focus of the contingent valuation analysis in this study.

There have been only 2 previous contingent valuation studies of marine fishing values in Florida. These studies, and the estimated economic values from each study, are listed in Table 10-3. Bell et al.'s study focused on the value of access to marine fishing in Florida. Specifically, respondents were asked how much their costs of fishing would have to increase to cause them to stop fishing completely. This question applied to all species and all sites in Florida so the average value of $58 per trip for residents indicates the overall importance of access to Florida marine fisheries. This value cannot be compared to the marginal values estimated in the present study because changes in bag limits and other catch regulations for individual species do not prevent anglers from going fishing whenever and wherever they want.

Table 10-3. Other Contingent Valuation Estimates of Marine Recreational Fishing Values in Florida

Study	Valuation Unit	$ Value per Trip
Bell et al. (1982)	Access to Fishing	$58.00
McConnell et al. (1992)	1 Fish Increase in Expected Catch	
	Big Game	$7.92
	Small Game	$0.58
	Bottom Fish	$0.01
	Flat Fish	$0.34

McConnell et al.'s study divided anglers into 4 groups depending on the species group they targeted on the fishing trip when they interviewed. These angler groups were big game, small game, bottom fish, and flat fish. The contingent valuation question asked respondents how much they would be willing to accept (in the form of a bank check) to give up fishing. This question is similar to the value of access question used by Bell et al. but McConnell et al. correlated the contingent valuation responses with an average catch rate measure they computed for each species group. They then used the correlation coefficient to estimate the marginal value of a 1 fish increase in "expected" catch. The resulting marginal value is similar to the "change in average catch" valuation scenarios used in the present study except that respondents in the McConnell et al. study did not respond directly to the marginal change (increase in species

group catch rate) that resulted from the computations. McConnell et al. did not estimate marginal values for bag limit changes.

McConnell et al.'s estimates in Table 10-3 apply to anglers along the Atlantic coast of Florida (the Gulf coast was not included in the study.) Of the 4 species groups, the small game group includes the most near-shore species (i.e. mackerel, pompano, red drum, and seatrout) that were evaluated in the present study. However, it also includes other popular game species such as snook, tarpon, and bonefish. The bottom fish group included two species that were also part of this study (i.e. mullet and sheepshead). Comparing these values with the derived marginal values per fish reported earlier in Table 10-2, it appears that the marginal values are relatively similar in magnitude. This is encouraging but somewhat surprising. The McConnell et al. estimates were derived for anglers targeting a specific species group whereas the results in Table 10-2 apply to all Florida anglers. It would be expected that anglers targeting a specific species would have a higher value for changes in catch rates than the average angler. Also, McConnell et al.'s form of the contingent valuation question, based on anglers' willingness to accept payment as compared to anglers' willingness to make a payment as in the present study, should lead to higher values (see Mitchell and Carson).

Thus, the limited number of contingent valuation studies for Florida's marine fisheries makes it impossible to determine whether the marginal valuation results from this study are reliable and valid measures of the economic value of changes in recreational catch regulations. This study has demonstrated that it is possible to present management alternatives to anglers and to elicit economic values for each alternative. This is the most appropriate type of information for economic analyses of fishery management decisions. However, additional studies are needed to verify these results and to consider other management alternatives that may be appropriate for Florida's marine fisheries. This research would provide fisheries managers with defensible estimates of the economic effects of fisheries regulations and help fisheries managers understand the reasons why anglers' place higher or lower values on management changes for specific species.

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APPENDIX 1: CONTINGENT VALUATION SURVEY FORMS

FORM A: BAG LIMITS: REDFISH 1-2, 1 > 27", MULLET 50-75, POMPANO 0-4

FORM B: BAG LIMITS: SEATROUT 10-15, 1 > 24", KING MACKEREL 2-5, SHEEPSHEAD 0-5.

FORM C: BAG LIMITS: REDFISH 1-3, 2 > 27", MULLET 50-100, POMPANO 0-2

FORM D: BAG LIMITS: SEATROUT 10-20 2 > 24", KING MACKEREL 2-10, SHEEPSHEAD 0-10

FORM E: PACKAGE 1: REDFISH 1-2, SEATROUT 10-15, MULLET 50-75, PACKAGE 3: POMPANO 0-2, SHEEPSHEAD 0-5

FORM F: PACKAGE 2: REDFISH 1-3, SEATROUT 10-20, MULLET 50-100, PACKAGE 4: POMPANO 0-4, SHEEPSHEAD 0-10

FORM G: AVERAGE CATCH: REDFISH 2-3, SEATROUT 3-5, KING MACKEREL 1:3 - 1:2

FROM H: AVERAGE CATCH: REDFISH 2-4, SEATROUT 3-7, KING MACKEREL 1:3 - 1:1

FORM A

BAG LIMIT CHANGES

REDFISH 1-2, 1 FISH > 27"

MULLET 50-75

POMPANO 0-4

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the daily bag limits for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. Because of the popularity of many near-shore fish species, it is necessary to control the total harvest through daily bag limits. The current FLORIDA fishing regulations for Redfish are:

Minimum size	-	18 inches
Maximum size	-	27 inches
Daily bag limit	-	1 fish per person
Closed season	-	March, April, and May

Over the past five years, the bag limit for Redfish changed from no limit to one fish. During that time, how did these changes affect your fishing?

1 NO EFFECT BECAUSE I DIDN'T FISH FOR REDFISH

2 I INCREASED THE AMOUNT OF TIME I FISHED FOR REDFISH

(IF YOU CIRCLED 1 OR 2 ABOVE, PLEASE SKIP TO QUESTION 3-2 ON THE NEXT PAGE).

3 I DECREASED THE AMOUNT OF TIME I FISHED FOR REDFISH

IF YOU CIRCLED 3, DID YOU SPEND MORE TIME FISHING FOR OTHER SPECIES INSTEAD OF REDFISH?

1 NO

2 YES

IF YOU SAID YES, PLEASE WRITE IN THE NAME OF THE FISH SPECIES YOU SPENT MORE TIME FISHING FOR:

_____

_____

3-2. Through various fishery management programs, it may be possible to increase the daily bag limit for Redfish from 1 to 2 per person. Size limits and the closed season would remain the same.

But, because so many fishermen fish for Redfish, there would not be enough for everyone if the bag limit was 2 fish. You could choose to buy a special Redfish license stamp in order to keep 2 fish. If you did not buy the stamp, your bag limit for Redfish would still be 1 Redfish. Please write in the space below the maximum amount of money you would be willing to pay for this Redfish stamp. If for any reason you would not buy this Redfish stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR REDFISH,

2 ONE REDFISH PER DAY IS ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL REDFISH YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A REDFISH STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH ONE MORE REDFISH WOULD BE WORTH TO YOU

3-3. Another potential change would be to allow fishermen to keep one Redfish over the maximum size limit of 27 inches long. Because there would not be enough large Redfish for everyone, you could choose to buy a special Redfish trophy license stamp in order to keep 1 fish over 27 inches. If you did not buy the stamp, you would not be able to keep any Redfish over 27 inches. Please write in the space below the maximum amount of money you would be willing to pay for this Redfish special trophy stamp. If for any reason you would not buy this Redfish stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR REDFISH,

2 REDFISH LESS THAN 27 INCHES ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL REDFISH YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A REDFISH TROPHY STAMP BECAUSE SIZE LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH A TROPHY REDFISH WOULD BE WORTH TO YOU.

3-4. Mullet is another popular near-shore fish. The current FLORIDA fishing regulations for Mullet are:

No size limits
Daily bag limit - 50 fish per person or 50 fish per boat per day whichever is less

It may be possible to increase the daily bag limit for Mullet from 50 to 75 fish per person or 75 fish per boat whichever is less with no change in size limits.

But, because so many fishermen fish for Mullet, there would not be enough for everyone if the bag limit was 75 fish. You could choose to buy a special Mullet license stamp that would provide funding to increase the daily Mullet bag limit from 50 to 75. If you did not buy the stamp, your bag limit for Mullet would still be 50 fish. Please write in the space below the maximum amount of money you would be willing to pay for this Mullet stamp. If for any reason you would not buy this Mullet stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR MULLET,

2 FIFTY OR FEWER MULLET PER DAY ARE ALL YOU WANT TO KEEP

3 YOU ALWAYS RELEASE ALL MULLET YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A MULLET STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO,

6 YOU DON'T KNOW HOW MUCH 25 MORE MULLET WOULD BE WORTH TO YOU

3-5. Other near-shore species such as Pompano have no bag limits. But, in the future it may be necessary to limit the catch of Pompano to 4 fish per person per day because of the growing number of people fishing for Pompano. Suppose you could choose to buy a special license stamp for Pompano that would allow you to keep as many as you want. If you did not buy this special stamp, the number of fish you keep could not exceed the new bag limit of 4 fish. Please write in the space below the maximum amount of money you would be willing to pay for this Pompano stamp. If you would not buy this stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR POMPANO,

2 FOUR OR FEWER POMPANO PER DAY ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL POMPANO YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A POMPANO STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH AN UNLIMITED BAG FOR POMPANO WOULD BE WORTH TO YOU

FORM B

BAG LIMIT CHANGES

SEATROUT 10-15, 1 FISH > 24"

KING MACKEREL 2-5

SHEEPSHEAD 0-10

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the daily bag limits for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. Because of the popularity of many near-shore fish species, it is necessary to control the total harvest through daily bag limits. The current FLORIDA fishing regulations for Spotted Seatrout are:

Minimum size	-	14 inches
Maximum size	-	24 inches; 1 fish over 24 inches allowed
Daily bag limit	-	10 fish per person
Closed season	-	None

Over the past five years, the bag limit for Spotted Seatrout changed from no limit to ten fish. During that time, how did these changes affect your fishing?

1 NO EFFECT BECAUSE I DIDN'T FISH FOR SPOTTED SEATROUT

2 I INCREASED THE AMOUNT OF TIME I FISHED FOR SPOTTED SEATROUT

(IF YOU CIRCLED 1 OR 2 ABOVE, PLEASE SKIP TO QUESTION 3-2 ON THE NEXT PAGE).

3 I DECREASED THE AMOUNT OF TIME I FISHED FOR SPOTTED SEATROUT

IF YOU CIRCLED 3, DID YOU SPEND MORE TIME FISHING FOR OTHER SPECIES INSTEAD OF SPOTTED SEATROUT?

1 NO

2 YES

IF YOU SAID YES, PLEASE WRITE IN THE NAME OF THE FISH SPECIES YOU SPENT MORE TIME FISHING FOR:

_____

_____

3-2. Through various fishery management programs, it may be possible to increase the daily bag limit for Spotted Seatrout from 10 to 15 per person. Size limits and the closed season would remain the same.

But, because so many fishermen fish for Spotted Seatrout, there would not be enough for everyone if the bag limit was 15 fish. You could choose to buy a special Spotted Seatrout license stamp in order to keep 15 fish. If you did not buy the stamp, your bag limit for Spotted Seatrout would still be 10 Spotted Seatrout. Please circle in the list below the maximum amount of money you would be willing to pay for this Spotted Seatrout stamp. If for any reason you would not buy this Spotted Seatrout stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SPOTTED SEATROUT,

2 TEN OR FEWER SPOTTED SEATROUT PER DAY ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL SPOTTED SEATROUT YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPOTTED SEATROUT STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH 5 MORE SPOTTED SEATROUT WOULD BE WORTH TO YOU

3-3. Currently fisherman are allowed to keep one Spotted Seatrout over the 24 inch maximum size limit. But, in the future it may become necessary to limit the catch of large Seatrout because of the growing number of people fishing for Seatrout. Suppose you could choose to buy a special license stamp for Spotted Seatrout that would allow to you keep one Spotted Seatrout over the 24 inch size limit. If you did not buy this special stamp, you would not be able to keep any Seatrout over the 24 inch size limit. Please circle in the list below the maximum amount of money you would be willing to pay for this Spotted Seatrout special trophy stamp. If for any reason you would not buy this Spotted Seatrout stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SPOTTED SEATROUT,

2 SPOTTED SEATROUT LESS THAN 24 INCHES ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL SPOTTED SEATROUT YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPOTTED SEATROUT TROPHY STAMP BECAUSE SIZE LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH A TROPHY SPOTTED SEATROUT WOULD BE WORTH TO YOU.

3-4. King Mackerel is another popular near-shore fish. The current FLORIDA fishing regulations for King Mackerel are:

Minimum size	-	12 inches
Maximum size	-	No limit
Daily bag limit	-	2 fish per person

It may be possible to increase the daily bag limit for King Mackerel from 2 to 5 fish per person with no change in size limits.

But, because so many fishermen fish for King Mackerel there would not be enough for everyone if the bag limit was 5 fish. You could choose to buy a special King Mackerel license stamp that would provide funding to increase the daily King Mackerel bag limit from 2 to 5. If you did not buy the stamp, your bag limit for King Mackerel would still be 2 fish. Please circle in the list below the maximum amount of money you would be willing to pay for this King Mackerel stamp. If for any reason you would not buy this King Mackerel stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR KING MACKEREL,

2 TWO OR FEWER KING MACKEREL PER DAY ARE ALL YOU WANT TO KEEP

3 YOU ALWAYS RELEASE ALL KING MACKEREL YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A KING MACKEREL STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO,

6 YOU DON'T KNOW HOW MUCH 3 MORE KING MACKEREL WOULD BE WORTH TO YOU

3-5. Other near-shore species such as Sheepshead have no bag limits. But, in the future it may be necessary to limit the catch of Sheepshead to 10 fish per person per day because of the growing number of people fishing for Sheepshead. Suppose you could choose to buy a special license stamp for Sheepshead that would allow you to keep as many as you want. If you did not buy this special stamp, the number of fish you keep could not exceed the new bag limit of 10 fish. Please circle in the list below the maximum amount of money you would be willing to pay for this Sheepshead stamp. If you would not buy this stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SHEEPSHEAD,

2 TEN OR FEWER SHEEPSHEAD PER DAY ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL SHEEPSHEAD YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SHEEPSHEAD LICENSE STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH AN UNLIMITED BAG FOR SHEEPSHEAD WOULD BE WORTH TO YOU

FORM C

BAG LIMIT CHANGES

REDFISH 1-3, 2 > 27"

MULLET 50-100

POMPANO 0-2

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the daily bag limits for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. Because of the popularity of many near-shore fish species, it is necessary to control the total harvest through daily bag limits. The current FLORIDA fishing regulations for Redfish are:

Minimum size	-	18 inches
Maximum size	-	27 inches
Daily bag limit	-	1 fish per person
Closed season	-	March, April, and May

Over the past five years, the bag limit for Redfish changed from no limit to one fish. During that time, how did these changes affect your fishing?

1 NO EFFECT BECAUSE I DIDN'T FISH FOR REDFISH

2 I INCREASED THE AMOUNT OF TIME I FISHED FOR REDFISH

(IF YOU CIRCLED 1 OR 2 ABOVE, PLEASE SKIP TO QUESTION 3-2 ON THE NEXT PAGE).

3 I DECREASED THE AMOUNT OF TIME I FISHED FOR REDFISH

IF YOU CIRCLED 3, DID YOU SPEND MORE TIME FISHING FOR OTHER SPECIES INSTEAD OF REDFISH?

1 NO

2 YES

IF YOU SAID YES, PLEASE WRITE IN THE NAME OF THE FISH SPECIES YOU SPENT MORE TIME FISHING FOR:

_____

_____

3-2. Through various fishery management programs, it may be possible to increase the daily bag limit for Redfish from 1 to 3 per person. Size limits and the closed season would remain the same.

But, because so many fishermen fish for Redfish, there would not be enough for everyone if the bag limit was 3 fish. You could choose to buy a special Redfish license stamp in order to keep 3 fish. If you did not buy the stamp, your bag limit for Redfish would still be 1 Redfish. Please circle in the list below the maximum amount of money you would be willing to pay for this Redfish stamp. If for any reason you would not buy this Redfish stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR REDFISH,

2 ONE REDFISH PER DAY IS ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL REDFISH YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A REDFISH STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH 2 MORE REDFISH WOULD BE WORTH TO YOU

3-3. Another potential change would be to allow fishermen to keep two Redfish over the maximum size limit of 27 inches long. Because there would not be enough large Redfish for everyone, you could choose to buy a special Redfish trophy license stamp in order to keep 2 fish over 27 inches. If you did not buy the stamp, you would not be able to keep any Redfish over 27 inches. Please circle in the list below the maximum amount of money you would be willing to pay for this Redfish special trophy stamp. If for any reason you would not buy this Redfish stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR REDFISH,

2 REDFISH LESS THAN 27 INCHES ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL REDFISH YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A REDFISH TROPHY STAMP BECAUSE SIZE LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH TWO TROPHY REDFISH WOULD BE WORTH TO YOU.

3-4. Mullet is another popular near-shore fish. The current FLORIDA fishing regulations for Mullet are:

No size limits
Daily bag limit - 50 fish per person or 50 fish per boat per day whichever is less

It may be possible to increase the daily bag limit for Mullet from 50 to 100 fish per person or 100 fish per boat per day whichever is less with no change in size limits.

But, because so many fishermen fish for Mullet, there would not be enough for everyone if the bag limit was 100 fish. You could choose to buy a special Mullet license stamp that would provide funding to increase the daily Mullet bag limit from 50 to 100. If you did not buy the stamp, your bag limit for Mullet would still be 50 fish. Please circle in the list below the maximum amount of money you would be willing to pay for this Mullet stamp. If for any reason you would not buy this Mullet stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR MULLET,

2 FIFTY OR FEWER MULLET PER DAY ARE ALL YOU WANT TO KEEP

3 YOU ALWAYS RELEASE ALL MULLET YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A MULLET STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH 50 MORE MULLET WOULD BE WORTH TO YOU

3-5. Other near-shore species such as Pompano have no bag limits. But, in the future it may be necessary to limit the catch of Pompano to 2 fish per person per day because of the growing number of people fishing for Pompano. Suppose you could choose to buy a special license stamp for Pompano that would allow you to keep as many as you want. If you did not buy this special stamp, the number of fish you keep could not exceed the new bag limit of 2 fish. Please circle in the list below the maximum amount of money you would be willing to pay for this Pompano stamp. If you would not buy this stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR POMPANO,

2 TWO OR FEWER POMPANO PER DAY ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL POMPANO YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A POMPANO STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH AN UNLIMITED BAG FOR POMPANO WOULD BE WORTH TO YOU

FORM D

BAG LIMIT CHANGES

SEATROUT 0-20, 2 FISH > 24"

KING MACKEREL 2-10

SHEEPSHEAD 0-5

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the daily bag limits for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. Because of the popularity of many near-shore fish species, it is necessary to control the total harvest through daily bag limits. The current FLORIDA fishing regulations for Spotted Seatrout are:

Minimum size	-	14 inches
Maximum size	-	24 inches; 1 fish over 24 inches allowed
Daily bag limit	-	10 fish per person
Closed season	-	None

Over the past five years, the bag limit for Spotted Seatrout changed from no limit to ten fish. During that time, how did these changes affect your fishing?

1 NO EFFECT BECAUSE I DIDN'T FISH FOR SPOTTED SEATROUT

2 I INCREASED THE AMOUNT OF TIME I FISHED FOR SPOTTED SEATROUT

(IF YOU CIRCLED 1 OR 2 ABOVE, PLEASE SKIP TO QUESTION 3-2 ON THE NEXT PAGE).

3 I DECREASED THE AMOUNT OF TIME I FISHED FOR SPOTTED SEATROUT

IF YOU CIRCLED 3, DID YOU SPEND MORE TIME FISHING FOR OTHER SPECIES INSTEAD OF SPOTTED SEATROUT?

1 NO

2 YES

IF YOU SAID YES, PLEASE WRITE IN THE NAME OF THE FISH SPECIES YOU SPENT MORE TIME FISHING FOR:

_____

_____

3-2. Through various fishery management programs, it may be possible to increase the daily bag limit for Spotted Seatrout from 10 to 20 per person. Size limits and the closed season would remain the same.

But, because so many fishermen fish for Spotted Seatrout, there would not be enough for everyone if the bag limit was 20 fish. You could choose to buy a special Spotted Seatrout license stamp in order to keep 20 fish. If you did not buy the stamp, your bag limit for Spotted Seatrout would still be 10 Spotted Seatrout. Please circle in the list below the maximum amount of money you would be willing to pay for this Spotted Seatrout stamp. If for any reason you would not buy this Spotted Seatrout stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SPOTTED SEATROUT,

2 TEN OR FEWER SPOTTED SEATROUT PER DAY ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL SPOTTED SEATROUT YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPOTTED SEATROUT STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH 10 MORE SPOTTED SEATROUT WOULD BE WORTH TO YOU

3-3. Currently fisherman are allowed to keep one Spotted Seatrout over the 24 inch maximum size limit. But, in the future it may become necessary to limit the catch of large Seatrout because of the growing number of people fishing for Seatrout. Suppose you could choose to buy a special license stamp for Spotted Seatrout that would allow you to keep two Spotted Seatrout over the 24 inch size limit. If you did not buy this special stamp, you would not be able to keep any Seatrout over the 24 inch size limit. Please circle in the list below the maximum amount of money you would be willing to pay for this Spotted Seatrout special trophy stamp. If for any reason you would not buy this Spotted Seatrout stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SPOTTED SEATROUT,

2 SPOTTED SEATROUT LESS THAN 24 INCHES ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL SPOTTED SEATROUT YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPOTTED SEATROUT TROPHY STAMP BECAUSE SIZE LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH 2 TROPHY SPOTTED SEATROUT WOULD BE WORTH TO YOU.

3-4. King Mackerel is another popular near-shore fish. The current FLORIDA fishing regulations for King Mackerel are:

Minimum size	-	12 inches
Maximum size	-	No limit
Daily bag limit	-	2 fish per person

It may be possible to increase the daily bag limit for King Mackerel from 2 to 10 fish per person with no change in size limits.

But, because so many fishermen fish for King Mackerel there would not be enough for everyone if the bag limit was 10 fish. You could choose to buy a special King Mackerel license stamp that would provide funding to increase the daily King Mackerel bag limit from 2 to 10. If you did not buy the stamp, your bag limit for King Mackerel would still be 2 fish. Please circle in the list below the maximum amount of money you would be willing to pay for this King Mackerel stamp. If for any reason you would not buy this King Mackerel stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10
$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR KING MACKEREL,

2 TWO OR FEWER KING MACKEREL PER DAY ARE ALL YOU WANT TO KEEP

3 YOU ALWAYS RELEASE ALL KING MACKEREL YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A KING MACKEREL STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH 8 MORE KING MACKEREL WOULD BE WORTH TO YOU

3-5. Other near-shore species such as Sheepshead have no bag limits. But, in the future it may be necessary to limit the catch of Sheepshead to 5 fish per person per day because of the growing number of people fishing for Sheepshead. Suppose you could choose to buy a special license stamp for Sheepshead that would allow you to keep as many as you want. If you did not buy this special stamp, the number of fish you keep could not exceed the new bag limit of 5 fish. Please circle in the list below the maximum amount of money you would be willing to pay for this Sheepshead stamp. If you would not buy this stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10
$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SHEEPSHEAD,

2 FIVE OR FEWER SHEEPSHEAD PER DAY ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL SHEEPSHEAD YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SHEEPSHEAD STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH AN UNLIMITED BAG FOR SHEEPSHEAD WOULD BE WORTH TO YOU

FORM E

PACKAGE VALUATION

REDFISH 1-2

SEATROUT 10-15

MULLET 50-75

POMPANO 0-2

SHEEPSHEAD 0-5

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the daily bag limits for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. Because of the popularity of many near-shore fish species such as Redfish, Seatrout and Mullet, it is necessary to control the total harvest through daily bag limits. The current FLORIDA bag limits for these species are:

REDFISH	-	1 fish per person per day; minimum size - 18 inches, maximum size - 27 inches
SEATROUT	-	10 fish per person per day; 1 fish over 24 inches allowed
MULLET	-	50 fish per person or 50 fish per boat per day whichever is less

Through various fishery management programs, it may be possible to change these daily bag limits to the following:

REDFISH	-	2 fish per person per day
SEATROUT	-	15 fish per person per day
MULLET	-	75 fish per person or 50 fish per boat per day whichever is less

Suppose it was possible to buy a special license stamp for these species that would provide funding to change the bag limits as described above. If you did not buy the stamp, your bag limits for these fish would stay the same as they are now. Please circle in the list below the maximum amount of money you would be willing to pay for this stamp. If for any reason you would not buy this stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR THESE SPECIES,

2 THE CURRENT LIMITS ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL OF THESE FISH YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPECIAL LICENSE STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH A CHANGE IN REDFISH, SEATROUT AND MULLET BAG LIMITS WOULD BE WORTH TO YOU

3-2. Other near-shore species such as pompano and sheepshead currently have no bag limits. In the future it may be necessary to limit the harvest of these species to:

POMPANO - 2 fish per person per day
SHEEPSHEAD - 5 fish per person per day

Suppose it would be possible to buy a special license stamp for these species that would allow you to keep as many sheepshead and pompano as you want. If you did not buy this special stamp, the number of fish you keep could not exceed the new bag limits. Please circle in the list below the maximum amount of money you would be willing to pay for this stamp. If you would not buy this stamp, please circle $0.

$0 $1 $2 $3 $4 $5 $6 $7 $8 $9 $10

$15 $20 $25 $30 $35 $40 $45 $50 $55 $60 Over $60

If you circled $0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR THESE SPECIES,

2 THE SUGGESTED BAG LIMITS WOULD BE ENOUGH FISH FOR YOU,

3 YOU ALWAYS RELEASE ALL THE POMPANO AND SHEEPSHEAD YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPECIAL LICENSE STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH A CHANGE IN POMPANO AND SHEEPSHEAD BAG LIMITS WOULD BE WORTH TO YOU

FORM F

PACKAGE VALUATION

REDFISH 1-3

SEATROUT 10-20

MULLET 50-100

POMPANO 0-4

SHEEPSHEAD 0-10

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the daily bag limits for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. Because of the popularity of many near-shore fish species such as Redfish, Seatrout and Mullet, it is necessary to control the total harvest through daily bag limits. The current FLORIDA bag limits for these species are:

REDFISH	-	1 fish per person per day; minimum size - 18 inches, maximum size - 27 inches
SEATROUT	-	10 fish per person per day; 1 fish over 24 inches allowed
MULLET	-	50 fish per person or 50 fish per boat per day whichever is less

Through various fishery management programs, it may be possible to change these daily bag limits to the following:

REDFISH	-	3 fish per person per day
SEATROUT	-	20 fish per person per day
MULLET	-	100 fish per person or 100 fish per boat per day whichever is less

Suppose it was possible to buy a special license stamp for these species that would provide funding to change the bag limits as described above. If you did not buy the stamp, your bag limits for these fish would stay the same as they are now. Please write in the space below the maximum amount of money you would be willing to pay for this stamp. If for any reason you would not buy this stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR THESE SPECIES,

2 THE CURRENT LIMITS ARE ALL YOU WANT TO KEEP,

3 YOU ALWAYS RELEASE ALL OF THESE FISH YOU CATCH,

4 YOU DON'T WANT TO PAY FOR A SPECIAL LICENSE STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY,

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH A CHANGE IN REDFISH, SEATROUT AND MULLET BAG LIMITS WOULD BE WORTH TO YOU

3-2. Other near-shore species such as pompano and sheepshead currently have no bag limits. In the future it may be necessary to limit the harvest of these species to:

POMPANO - 4 fish per person per day
SHEEPSHEAD - 10 fish per person per day

Suppose it would be possible to buy a special license stamp for these species that would allow you to keep as many sheepshead and pompano as you want. If you did not buy this special stamp, the number of fish you keep could not exceed the new bag limits. Please write in the space below the maximum amount of money you would be willing to pay for this stamp. If you would not buy this stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR THESE SPECIES.

2 THE SUGGESTED BAG LIMITS WOULD BE ENOUGH FISH FOR YOU.

3 YOU ALWAYS RELEASE ALL THE POMPANO AND SHEEPSHEAD YOU CATCH.

4 YOU DON'T WANT TO PAY FOR A SPECIAL LICENSE STAMP BECAUSE BAG LIMITS ARE NOT ENFORCED ANYWAY.

5 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

6 YOU DON'T KNOW HOW MUCH A CHANGE IN POMPANO AND SHEEPSHEAD BAG LIMITS WOULD BE WORTH TO YOU

FORM G

AVERAGE CATCH VALUATION

REDFISH 2-3

SEATROUT 3-5

KING MACKEREL 1 FISH PER 3 TRIPS TO 1 FISH PER 2 TRIPS

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the number of fish caught by a typical Florida fisherman for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. REDFISH is a popular near-shore fish. The current FLORIDA fishing regulations for Redfish are:

Minimum size	-	18 inches
Maximum size	-	27 inches
Daily Bag Limit	-	1 fish per person
Closed Season	-	March, April, May

Currently, a typical fisherman catches an average of 2 Redfish for every trip spent fishing for Redfish. Through various fishery management programs it may be possible to increase the number of Redfish caught by an average fisherman from the current rate of 2 fish per trip to 3 fish per trip. All current size limits, bag limits and closed seasons would remain the same. However, this increase cannot occur unless recreational fishermen agreed to pay for a special Redfish Stamp. The purchase of the Redfish Stamp would be voluntary and all proceeds from its sale would be used to increase the number of Redfish. Please write in the space below the maximum amount of money you would be willing to pay for this special Redfish Stamp. If for any reason you would not be willing to pay for this Redfish Stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR REDFISH,

2 YOU ALREADY CATCH ALL THE REDFISH YOU CARE TO,

3 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

4 YOU DON'T KNOW HOW MUCH A CHANGE IN THE NUMBER OF REDFISH, CAUGHT BY AN AVERAGE FISHERMAN WOULD BE WORTH TO YOU

3-2. Spotted Seatrout is another popular near-shore fish. The current FLORIDA fishing regulations for Spotted Seatrout are:

Minimum size	-	14 inches
Maximum size	-	24 inches, 1 fish over 24 inches allowed
Daily Bag Limit	-	10 fish per person
Closed season	-	None

Currently, a typical fisherman catches an average of 3 Spotted Seatrout for every trip spent fishing for Spotted Seatrout. Through various fishery management programs it may be possible to increase the number of Spotted Seatrout caught by an average fisherman from the current rate of 3 fish per trip to 5 fish per trip. All current size limits, bag limits and closed seasons would remain the same. However, this increase cannot occur unless recreational fishermen agreed to pay for a special Spotted Seatrout Stamp. The purchase of the Spotted Seatrout Stamp would be voluntary and all proceeds from its sale would be used to increase the number of Spotted Seatrout. Please write in the space below the maximum amount of money you would be willing to pay for this special Spotted Seatrout Stamp. If for any reason you would not be willing to pay for this Spotted Seatrout Stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SPOTTED SEATROUT,

2 YOU ALREADY CATCH ALL THE SPOTTED SEATROUT YOU CARE TO,

3 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

4 YOU DON'T KNOW HOW MUCH A CHANGE IN THE NUMBER OF SPOTTED SEATROUT CAUGHT BY AN AVERAGE FISHERMAN WOULD BE WORTH TO YOU

3-3. King Mackerel is another popular near-shore fish. The current FLORIDA fishing regulations for King Mackerel are:

Minimum size	-	12 inches
Maximum size	-	No limit
Daily Bag Limit	-	2 fish per person
Closed season	-	None

Currently, a typical fisherman catches an average of 1 King Mackerel for every three trips spent fishing for King Mackerel. Through various fishery management programs it may be possible to increase the number of King Mackerel caught by an average fisherman from the current rate of 1 fish per every 3 trips to 1 fish per every two trips. All current size limits, bag limits and closed seasons would remain the same. However, this increase cannot occur unless recreational fishermen agreed to pay for a special King Mackerel Stamp. The purchase of the King Mackerel Stamp would be voluntary and all proceeds from its sale would be used to increase the number of King Mackerel. Please write in the space below the maximum amount of money you would be willing to pay for this special King Mackerel Stamp. If for any reason you would not be willing to pay for this King Mackerel Stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR KING MACKEREL,

2 YOU ALREADY CATCH ALL THE KING MACKEREL YOU CARE TO,

3 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

4 YOU DON'T KNOW HOW MUCH A CHANGE IN THE NUMBER OF KING MACKEREL CAUGHT BY AN AVERAGE FISHERMAN WOULD BE WORTH TO YOU

FORM H

AVERAGE CATCH VALUATION

REDFISH 2-4

SEATROUT 3-7

KING MACKEREL 1 FISH PER 3 TRIPS TO 1 FISH PER EVERY TRIP

Fisheries managers need information about the importance and value of different fish species to decide how research and management could be used to improve recreational fishing in Florida. In this next section we ask how you would feel about buying special fishing license stamps that would allow possible changes in the number of fish caught by a typical Florida fisherman for a few popular fish. There are no right or wrong answers to these questions - - only your opinions. Your answers will provide important information about the value of these species to you. Please answer these questions even if you do not possess a current saltwater fishing license.

3-1. REDFISH is a popular near-shore fish. The current FLORIDA fishing regulations for Redfish are:

Minimum size	-	18 inches
Maximum size	-	27 inches
Daily Bag Limit	-	1 fish per person
Closed Season	-	March, April, May

Currently, a typical fisherman catches an average of 2 Redfish for every trip spent fishing for Redfish. Through various fishery management programs it may be possible to increase the number of Redfish caught by an average fisherman from the current rate of 2 fish per trip to 4 fish per trip. All current size limits, bag limits and closed seasons would remain the same. However, this increase cannot occur unless recreational fishermen agreed to pay for a special Redfish Stamp. The purchase of the Redfish Stamp would be voluntary and all proceeds from its sale would be used to increase the number of Redfish. Please write in the space below the maximum amount of money you would be willing to pay for this special Redfish Stamp. If for any reason you would not be willing to pay for this Redfish Stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR REDFISH,

2 YOU ALREADY CATCH ALL THE REDFISH YOU CARE TO,

3 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

4 YOU DON'T KNOW HOW MUCH A CHANGE IN THE NUMBER OF REDFISH, CAUGHT BY AN AVERAGE FISHERMAN WOULD BE WORTH TO YOU

3-2. Spotted Seatrout is another popular near-shore fish. The current FLORIDA fishing regulations for Spotted Seatrout are:

Minimum size	-	14 inches
Maximum size	-	24 inches, 1 fish over 24 inches allowed
Daily Bag Limit	-	10 fish per person
Closed season	-	None

Currently, a typical fisherman catches an average of 3 Spotted Seatrout for every trip spent fishing for Spotted Seatrout. Through various fishery management programs it may be possible to increase the number of Spotted Seatrout caught by an average fisherman from the current rate of 3 fish per trip to 7 fish per trip. All current size limits, bag limits and closed seasons would remain the same. However, this increase cannot occur unless recreational fishermen agreed to pay for a special Spotted Seatrout Stamp. The purchase of the Spotted Seatrout Stamp would be voluntary and all proceeds from its sale would be used to increase the number of Spotted Seatrout. Please write in the space below the maximum amount of money you would be willing to pay for this special Spotted Seatrout Stamp. If for any reason you would not be willing to pay for this Spotted Seatrout Stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR SPOTTED SEATROUT,

2 YOU ALREADY CATCH ALL THE SPOTTED SEATROUT YOU CARE TO,

3 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

4 YOU DON'T KNOW HOW MUCH A CHANGE IN THE NUMBER OF SPOTTED SEATROUT CAUGHT BY AN AVERAGE FISHERMAN WOULD BE WORTH TO YOU

3-3. King Mackerel is another popular near-shore fish. The current FLORIDA fishing regulations for King Mackerel are:

Minimum size	-	12 inches
Maximum size	-	No limit
Daily Bag Limit	-	2 fish per person
Closed season	-	None

Currently, a typical fisherman catches an average of 1 King Mackerel for every three trips spent fishing for King Mackerel. Through various fishery management programs it may be possible to increase the number of King Mackerel caught by an average fisherman from the current rate of 1 fish per every 3 trips to 1 fish per every trip. All current size limits, bag limits and closed seasons would remain the same. However, this increase cannot occur unless recreational fishermen agreed to pay for a special King Mackerel Stamp. The purchase of the King Mackerel Stamp would be voluntary and all proceeds from its sale would be used to increase the number of King Mackerel. Please write in the space below the maximum amount of money you would be willing to pay for this special King Mackerel Stamp. If for any reason you would not be willing to pay for this King Mackerel Stamp, please write in a 0.

_____ (Write in a $ amount or a 0)

If you wrote in a 0 ABOVE, did you do this because: (CIRCLE ONE ANSWER)

1 YOU DON'T FISH FOR KING MACKEREL,

2 YOU ALREADY CATCH ALL THE KING MACKEREL YOU CARE TO,

3 YOU DON'T WANT TO PAY ANY MORE TO FISH THAN YOU ALREADY DO, OR

4 YOU DON'T KNOW HOW MUCH A CHANGE IN THE NUMBER OF KING MACKEREL CAUGHT BY AN AVERAGE FISHERMAN WOULD BE WORTH TO YOU